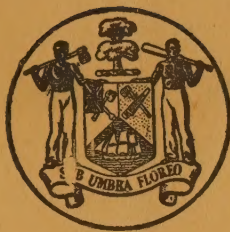


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BRITISH HONDURAS



ANNUAL REPORT

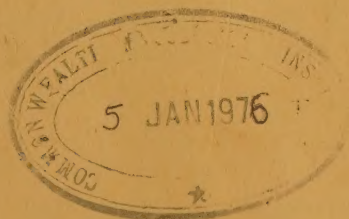
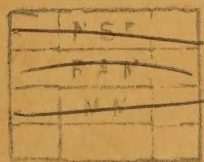
OF THE

Department Of Agriculture And Fisheries

FOR THE YEAR

to old

1968



DEPARTMENT OF AGRICULTURE AND FISHERIES

ANNUAL REPORT

FOR THE YEAR ENDED 31st DECEMBER, 1968

I. INTRODUCTION

POLICY

The basic policy of the Department remained the same:- namely

- (1) To obtain the maximum degree of self sufficiency in respect of all crops and livestock products that can be economically produced within the country.
- (II) To improve the quality, quantity, and range of export crops.
- (III) To develop the livestock industry and promote export in the trade thereof.
- (IV) To further develop the fishing industry and expand the range of export production.
- (V) To conserve the natural resources
- (VI) To promote farming as a way of life based on a sound system of agriculture.
- (VII) To ensure the fullest possible integration between skill and capital input and indigenous farmers, and that national farmers participate actively in the agricultural development of the country.

2. British Honduras remains one of the few countries with such a high percentage of cultivable land awaiting development. To a certain extent the conditions which have in the past inhibited development, namely, poor communications both external and internal, a small internal market, and a dearth of investment capital and skills remains the same. Much of the high potential agricultural land has been held in private absentee ownership for many years without any development taking place. The introduction of the Rural Land Utilization Tax in January 1966 marked a major step forward in changing this state of affairs and its effects are already being felt. The appearance of some large production units is a direct consequence of this law.

3. General Review

The year 1968 was in general a good crop year as rainfall was fairly evenly distributed. Rice, corn and beans gave better yields than the previous year and as a consequence overall national production was higher in these crops. The sugar crop was not as good as expected production being 63,558 tons as compared to 58,320 tons during 1967 caused by severe froghopper attack of cane fields and also poor husbandry standards generally. Citrus production remained fairly static as there was no marked change in depressed world market prices.

II. WEATHER

4. The amount and distribution of rainfall was favourable for the planting, growth and harvesting of major food crops. During the usual dry season most stations received some rainfall but not sufficient to prevent the usual burning. The rainfall pattern undoubtedly contributed to the overall agricultural progress shown.

Toledo Agricultural Station in the south recorded 143.44 inches of rainfall as compared to 127.09 in 1967 whilst the Corozal Agricultural Station in the north recorded 46.06 inches in 1968 as against 52.56 inches in 1967.

III. LIVESTOCK INDUSTRY

5. The national herd which was estimated at 34,000 head during 1967 was found to be only 29,000 according to a cattle census taken early in 1968. Later in the year another census was taken and it was found that the numbers of animals had not appreciably changed. Several factors contributed to this situation.

It was observed that some 2,000 female animals were slaughtered annually and it is estimated that a half of these were potential breeders. Further there had been no appreciably expansion or improvements in pastures. The opening of a private abattoir did not materialize during the year with the result that raisers who were overstocked sold off their excess animals.

During February a Livestock Association was established with much support and nurturing from Government. This replaces a previously defunct organization and shows good promise of carrying on as soon as it is able to realize some finances to do so on its own.

In November regulations had to be passed to control the sale of cattle for **butchering**. The regulation prohibits the sale for slaughter of all female cattle under 500 lbs liveweight. It is unfortunate that the regulation does not control slaughter directly. Exports of cattle to Mexico have been prohibited. The Department imported further breeding stocks from Costa Rica in March. Fourteen Brown Swiss heifers and a young bull in addition to one 15/16 Charolais bull were introduced. There is a raising trend in the pig and poultry populations coinciding with better harvests of corn and rice and possibly also as a result of a general shortage of beef.

Exports of live cattle, pigs, sheep and poultry to Mexico continued to be of considerable importance as an outlet for surplus production. Exports and value are as follows:-

Cattle	391 head	-	\$44,287	(no exports after November 1968)
Pigs	1,474 head		75,878	
Eggs	24,660 doz.		16,414	
Sheep	39 head		309	
Poultry	15,053 head		31,405	

Animal Husbandry and Pasture Work

The year commenced very badly with an outbreak of Virus Pneumonia in the breeding pigs at Central Farm. Many had to be destroyed and others isolated. It was not until July that fresh breeding stock could again be sold to farmers. As a result of this the demand for breeding animals could not be met. It was therefore planned to increase to 30 breeding sows at Central Farm, 9 at Orange Walk and 6 at Stann Creek. At year's end funds were not available to effect the necessary expansion.

Piggery units at Yo Creek, Stann Creek and Toledo through the year have performed useful work in making stud boars available to farmers. All units have maintained good standards during the year, but supply of breeding stock has not been able to keep up with demand.

The work of introducing and comparing new grass species with those presently in use continued during a part of the year at Central Farm.

Comparative yields of grasses under test 1967/68

A maximum of seven cuts were made during the twelve months ending on July 11th, 1968. The area of each plot was 16 sq. yards (12 feet x 12 feet).

<u>Rate of fertilizer applied:</u>	On December 13th, 1967	- 100 lbs triple phosphate/ac.
		100 lbs ammonia " /ac.
	On June 3rd, 1968	150 lbs/diammon/ac.

Yields in order of dry matter content is attached. It will be appreciated that under different conditions the order as listed is likely to change.

The 'Merker' strain of elephant grass produced enough feed to maintain three breeding cows per acre all year. The jaragua grass produced enough to maintain one cow per acre, and the 'Molopo' Buffel enough for $1\frac{1}{2}$ cow per acre all year.

IV EXPORT CROPS

Sugarcane

The Libertad Sugar Factory operated during the period 28th November, 1967 and ended on July 10th, 1968. The Tower Hill Factory started on the 12th December, 1967 and ended on May 26th, 1968. During the season approximately 38,901 acres of sugarcane was harvested. Production from the Libertad and Tower Hill Factories were 39,883 and 23,705 tons respectively. Grinding season lasted 225 days. Farmers received \$10.92 per ton for cane delivered. A survey carried out during 1968 placed the acreage of sugarcane at approximately 42,300 acres as follows:

Corozal

Cane Farmers	20,100
B.S.I.	5,256

Orange Walk

Cane Growers	7,958
B.S.I.	8,986

Figures for the 1968 crop are as follows:-

	<u>Libertad</u>	<u>Tower Hill</u>	<u>Total</u>
Cane ground	383,010 tons	259,505 tons	642,515
Sugar produced	39,883	23,705	63,588
Acreage(Cane Farmers)	20,281	6,620	26,901
		12,000	12,000
Tons/acre " "			
T.C.T.S.	9.60	10.95	
Molasses	15,256	8,935	24,191
Value Sugar	\$8.1 million		

The production target was 75,000 tons as against 63,558 tons realized - the shortfall was due to several factors, a high T.C.T.S. of 9.6 and 10.95 at Libertad and Tower Hill respectively. Thus at Tower Hill some 11 tons of cane were required to make 1 ton of sugar against a mean of 8.5 T.C.T.S. for production at Libertad, further cane was lost through strike action and factory breakdowns and a fairly severe outbreak of froghopper. A shortage of cane resulted in the Orange Walk area whilst the factory capacity at Libertad was shown to be less than the 45,000 tons expected.

Citrus

Crop Statistics 1965/68

<u>Year</u>	<u>Oranges</u> (90 lb. boxes)	<u>Grapefruit</u> (80 lb. boxes)
1965/66	952,064	247,067
1966/67	298,545	235,904
1967/68	730,736	233,433
1968/69	706,376	281,310

The citrus acreages given below include those planted during 1968.
(note: none-bearing means all trees 3 years old and under)

<u>Type</u>	<u>Total</u> <u>Acreage</u>	<u>Acreage</u> <u>Bearing</u>	<u>Acreage</u> <u>Non-bearing</u>
Grapefruit	2,307.17	929.13	1,377.84
Orange	6,703.03	2,973.85	3,729.18
	9,010.20	3,903.18	5,107.02

The total crop purchased was 964,109 boxes, the comparatively low prices obtained preclude the delivery of fruit from the more out-lying producers in the Cayo District - thus the full potential was not realised. Small producers also find it difficult to adequately maintain and fertilize their groves out of the low net returns they have been obtaining. Mexican Fruit Fly, premature fruit drop and poor husbandry inhibit the further full realization of potential. The United Kingdom continues to be the chief export market for B.H. citrus products, other countries to which exports are made are Canada, U.S.A., Fiji, France and the West Indies. A small fresh fruit export market exists with Mexico, the bulk of this being oranges with smaller quantities of grapefruit and tangerines. There was no significant expansion in acreages during the reporting period. Value of citrus exports for 1967 was \$3,470,925 B.H.

Bananas

The banana industry continued to expand its export production during 1968. Total acreage in the south at the end of 1968 was estimated at 2,320 acres.

Principal Growers during 1968 were:-

Messrs Green and Atkins
Caribbean Empire Co.
Messrs Morey
Messrs Zabaneh

Banana export data:-

Boxes of 40 lbs. net each.

1964 -	11,337 boxes
1965	20,530 "
1966	169,249 "
1967	152,231 "
1968	205,000 "

'Sigatoka', low yields in some areas and small fruit size were problems affecting the industry.

Cucumber

The Belize Offshore Growers Ltd. started planting cucumbers at Mid-October for the U.S. winter market. By year's end some 600 acres were planted to cucumber in addition to 12 acres of tomatoes of the varieties, Indian River, Manepal and Floradel. Picking of cucumbers commenced 15th December. It was expected to plant a total of 650 acres in cucumbers.

Crop Export data:-

1967/68 Season - Net acres	475
Cucumbers harvested	8,101,000 lbs
Cucumbers exported	6,262,000 lbs

1968/69 Season - Net acres	650
Cucumbers harvested	11,790,000 lbs.
Cucumbers exported	8,122,000 lbs.

1968/69 Season - Net acres	12
Tomatoes harvested	45,000 lbs
Tomatoes exported	247,000 lbs.

Honey and Beekeeping

British Honduras honey production totalled 468,158 pounds in 1968 compared to 425,078 lbs during 1967 - a 10% increase. The number of beehives declined 8%. Domestic consumption totalled 70,438 lbs as compared to 76,409 lbs during 1967.

Honey exported to the United Kingdom totalled 178 long tons or 397,720 lbs of the following classifications:-

White 40 drums
Golden 500 drums
Light Amber 65 drums
605

Moisture content 15-18.5%
Net weight/drum 660 lbs.
Gross weight/drum 703 lbs.

Price paid by Kimpton Brothers was £96 sterling to the long ton (F.O.B. Belize City Port) as compared to £81 C.I.F. France and England. There was an average production of approximately 98 lbs. of honey per hive in the Districts and the number of full colonies marked in all districts during the honey flow was 4,779 hives as compared to 4,922 during 1967.

During the year approximately 11,344 lbs of wax was produced the greater part used to produce 10,000 sheets of wax foundation sold at 16-20¢ per sheet by Norwalk Honey Producers Ltd.

Trade figures reveal that the 397,720 lbs of honey exported was valued at \$69,776.00.

The position at the end of 1968 was as follows:-

District	Apiaries	Hives	Beekeepers	1967 Production	1968 Production
Prozal	83	2,208	41	270,600	227,638
Range Walk	76	2,230	30	148,950	222,860
ayo	5	72	4	1,370	9,000
tann Creek	4	28	4	330	1,320
ledo	5	50	4	720	3,300
aye Caulker	1	2	1	72	80
elize	5	158	5	3,306	3,960
	179	4,748	89	425,078	468,158

Cacao

During 1968 Caribbean Investment Ltd. on the Hummingbird Highway carried out clearing of old established fields and planting of new shades. At Roaring River Estate some 200 acres of abandoned fields were rehabilitated. Under new ownership the Dolores Estate in the Toledo District undertook the rehabilitation of some 300 acres of long abandoned cacao fields. Messrs T. Salam and T. Tulcey of San Antonio and Columbia, Toledo District respectively sold a total of 1,600 lbs of fermented beans to Caribbean Investments Ltd., the Department assisting in the fermenting and shipping.

Exports by Caribbean Investment Co. Ltd. sole exporter, amounted to 73,100 lbs valued at \$26,628.

Tobacco

This commodity is produced by one Company solely - Honduran Tobacco Company. Exports during 1968 from the 1967 crop amounted to 13,957 lbs. valued at \$7,146 at the end of the year some 35 acres had been planted viz. 18 acres Virginia and 17 acres Burley Variety. Acreage planted has decreased considerably from the 1966 crop of 250 acres planted and harvested.

V. FOOD CROPS

Conditions for cleaning, planting and harvesting of major food crops during the year was very favourable with resulting fair to good yields obtained. Most of the food crops were produced as usual by milperos whose method of cultivation is still shifting and slash-burning. Only in the production of rice is this method undergoing significant changes.

Beans - Red Kidney

<u>Year</u>	<u>Acreage</u>	<u>Est. Production</u> (000 lbs)	<u>Marketing Board</u> <u>Purchases (000 lbs)</u>
1962/63	1,587	1,269	747
1963/64	1,810	905	483
1964/65	1,884	1,507	584
1965/66	3,484	2,187	592
1966/67	2,219	1,667	409
1967/68	4,013	2,809	545
1968/69	4,748	3,419	115

The crop planted traditionally in late 1967 and into the beginning of 1968 showed a marked increase in acreage planted with estimated production in the Toledo District being the only area where planting is less than usual.

The local Mennonite Communities have shown quite an interest in this crop and have markedly expanded acreages. A lot of this production is stored until local market conditions improve when it is slowly released at higher prices. Certified seeds for planting was again imported from the U.S. but small farmers generally shy off due to the high cost although it is becoming more generally realized that imported seeds are superior if properly fertilized and cared for.

Maize

<u>Year</u>	<u>Acreage</u>	<u>Est. Production</u> 000 lbs	<u>Marketing Board</u> <u>Purchases (000 lbs)</u>
1963	13,331	6,665	228
1964	11,383	9,107	776
1965	13,390	12,051	256
1966	15,506	6,742	36
1967	14,890	14,800	81
1968	16,361	15,473	511

Seeds of various types are now in common use including Mexican and American hybrid varieties in addition to the Mexican synthetic VS550A which was introduced 2 years ago. It is hoped next year to introduce one of the Pioneer Hybrid varieties synthesized in Jamaica for sale to Central American countries generally. This is expected to do better than U.S. hybrids. Acreages planted continue to rise due in part to renewed interest in pig rearing. So far only a few farmers besides the Mennonites have grown this crop on large tracts of land using machinery. The Northern Districts which are the centers of the sugar cane industry (which years ago produced much more corn) is showing a shift towards growing more corn in order to diversify into swine and poultry production. At the present rate of development of the pig and poultry industries exports of corn are not foreseen in the near future even in the light of expanding production.

Rice

<u>Year</u>	<u>Acreage</u>	<u>Est. Production</u> <u>Paddy (000 lbs)</u>	<u>Marketing Board Purchases</u> <u>Paddy (000 lbs)</u>
1963/64	3,131	4,695	2,718
1964/65	3,918	5,877	4,508
1965/66	6,381	7,657	5,230
1966/67	4,578	3,130	2,648
1967/68	5,130	8,146	5,958
1968/69	4,421		

The rice crop was a pretty good one as can be seen from the Marketing Board paddy purchases 1968 over 1967. Some new varieties of the Nilo series (El Salvador origin) were more generally available to farmers than the previous year. In the Toledo District, the traditional rice growing area, production was the highest since the bumper crop of 1965 as can be seen from the following table.

<u>Year</u>	<u>Acreage</u>	<u>Marketing Board Purchases (lbs)</u>
1964	2,290	3,003,567
1965	2,432	3,624,421
1966	1,638	1,436,314
1967	1,462	2,430,903
1968/69	2,381	3,168,497

The following varieties were planted in Toledo in order of acreages: Century Patna, Texas Patna, Nilo 2, Belle Patna, Blue Bonnett, B.H. Creole, Fortuna, Dima 2, Barley.

During the year the Department of Agriculture initiated two pilot schemes for mechanized rice production with funds provided by a C.D. & W. Grant. These were put in the Mafredi and San Pedro Columbia areas and acreages were 93 and 60 acres respectively. All operations except weeding were carried out mechanically and the schemes proved quite successful. They both combined producing one tenth of the Districts total crop. The combine harvesting proved its worth and aroused great interest.

There is now wide-spread acceptance of weedicide in the control of rice weeds. Those used were 2, 4-D, Shell 40 and Trioxone 50. Stam F34 mixed with small amounts of 2,4-D also proved successful.

Vegetables(not including cucumbers and tomatoes)

The usual situation has not changed much, the country not being climatically suited to all-year production of temperate vegetable crops. Furthermore very little irrigation is available and rain-fed winter season over production of most vegetables is the general rule. During the off-season imports from the P.R. by air and from Mexico and Guatemala by road and sea respectively are the main source of supply. This problem is not expected to disappear as it is being aggravated by a small but growing tourist industry consisting of American and Canadian visitors in the main who demand fresh vegetables all year round.

Plantains

Supplies are generally sufficient for the local demand with seasonal gluts. An attempt is being made to export fresh fruit to the U.S. market, the entrepreneur having planted 65 acres with expectations to buy fruit from small farmers in the Monkey River area but the possibilities seem dim; local small farmers do not use fertilizers and fruit would only be of suitable size on newly cleared land.

Other Food and Fruit Crops

Supplies of cassava flour, sweet potatoes and other edible roots and tubers were generally adequate being supplemented with imported Irish potatoes and onions. During 1968 the mango crop was fair to good following upon a bumper crop during 1967.

VI. AGRICULTURAL DEVELOPMENT AND EXTENSION WORK

General

There was no overall improvement in Departmental staffing position. The Entomologist did not renew his contract at the end of his tour of duty and the Farm Planning Officer was kept on District duties, causing the unit to be of limited use. The number of Veterinary Officers was increased to two. Only two districts of the six were headed by graduate personnel, the others being headed by Assistant Agricultural Officers.

Central Farm continues to do good work with the available technical staff.

A Fisheries Biologist joined the staff of the Fisheries Unit which moved into its new laboratory building in June.

(a) Agricultural Education

The Agricultural Education Officer initiated a weekly radio programme "Farming for Progress" over the Government Radio Station.

A total of 77 persons received training at the Central Farm Agricultural School over a total of 118 days. Eight Farm Demonstrators attended Course 'B' during March, and 10 attended Course 'A' during the latter part of the year. Special extension courses were run for staff by Dr. D.Gill, F.A.O. Extension Specialist who was attached to the Department.

Eighty-one farmers from the Toledo District toured Central Farm and neighbouring areas for two days and a group of students from Lynam Agricultural College did the same for one day.

A total of 33 primary school teachers attended special courses at the school at which time they were given lectures on agricultural matters by the Specialist Officers of the Department at Central Farm.

Lecture demonstrations were given at 3 villages in the Corozal District and one to Village Council leaders of the Cayo District, two lectures on 4-H Youth Work were given to Youth Organizers of the Social Development Department.

Publications

The following publications were put out and circulated to interested farmers:-

Ext. Circular No. 1 - Corn Seed Selection	
Carta No. 1/68	La Selecccion de Maiz para semillas
Ext. Circular No. 2	Rice Bran as a stock feed
Carta No. 2/68	El uso de 'Rice Bran' como Comida para Animales
Bulletin No. 1	Protect your Stored Grain against Insects and Rats.
Agricultural Notes No. 1	
Agricultural Notes No. 2	

(b) Fisheries

Total exports of fisheries products have risen from 670,606 lbs in 1963 to 1,407,838 pounds in 1968. Most of the increase during the year came from exports of conch.

Exports of lobster tails are given in the following table:-

Exporter	1967		1968	
	Weight	No. of Tails	Weight	No. of Tails
Sarteneja Fishermen			8,147	16,755
Caribena Producers	115,880	228,680	123,907	257,843
Northern Fishermen	83,360	223,229	149,700	429,309
National Fishermen	86,520	224,476	77,960	193,426
Placencia Producers	27,680	42,458	36,160	58,403
Toledo Fishermen	3,530	5,744	1,994	4,172
Total	316,970	724,587	397,868	959,908

Note: All exporters are registered Co-operatives.

The statistical lobster programme started at the beginning of the 1965/66 season continues. Fishermen are still reluctant to fill out and return necessary forms. No legislation to make this compulsory has yet been passed.

Quotas amounting to 481,000 lbs lobster tails were allocated to 5 fishing Co-operatives. There are some 450 producers of lobsters(fishermen).

Due to the high demand any good price paid exports of conch has continued to increase. The grouper season was fair but poorer than the previous year. Black snapper and silk snapper runs were good.

F.A.O. assistance continued and it is hoped that their personnel will be available for another six years. A Fisheries Biologist joined the local staff in June.

The staff moved into the new laboratory building in June although work on the premises was not fully completed. By year's end most of the equipment had arrived. A new launch was obtained. It is equipped with a hydraulic winch and echo sounder. It is to be used for exploratory fishing with a view to opening new fishing areas in deeper waters and to develop other fishing methods and techniques.

(c) Agricultural Shows:-

One major show was held at the New Capital Site Roaring Creek in the Cayo District being a combined effort of the Cayo and Stann Creek Show Committees. One minor show was held in the Toledo District and one in the Orange Walk District.

VII. RESEARCH AND INVESTIGATIONS

Horticulture

The only research work conducted on fruits is that carried out on citrus for the Citrus Growers Association by the Citrus Research Unit of the University of the West Indies. The Department of Agriculture undertakes all vegetable trials. In the main this consists of screening new varieties before recommending or releasing to farmers as at present no breeding or physiological investigation is carried out.

The following varieties of avocado were received from Mexico and planted at Central Farm to observe adaptability and to keep records of time of maturity of fruit.

<u>Variety</u>	<u>Supposed time of fruiting</u>
Temporal	September
Tixcoobob	November
Itza	December
Collinson	January

Vegetables

Records on vegetable varietal trials were collected from trials carried out at San Roman(Corozal), Yo Creek (Orange Walk) and Central Farm (Cayo). See Appendix /O for Table on most favourable time of planting of the various types of vegetables.

SECTION I - CROPS

Corn (Zea Mays)

This year forty acres of Poey T66, hybrid corn and two acres of Sintux (open pollinated white corn) were planted by the Research Division. The objectives of this project were three fold (1) to obtain information on the yield of this hybrid corn on large plots; (2) to determine whether or not it would be feasible to harvest mechanically; (3) to obtain feed for livestock at Central Farm.

It was found that mechanical harvesting, apart from being practical, was much quicker and more economical than hand harvesting, provided the area to be harvested was free from vines and tall shrubs. The section of the mechanical harvester which removes dirt and debris were disconnected as there was continuous jamming in this sector. After this minor adjustment the picker went on to harvest the entire forty acres of hybrid corn without any stoppages.

An application of 150 lbs per acre of 18:46:0 fertilizer was applied at the time of planting. When the plants were approximately 18 inches tall, an application of 50 lbs Urea per acre was applied. No weeding was required in this field as the original weeds were allowed to grow to a height of approximately 6 inches before the final harrowing was done. This system controls the weeds quite well. There were little or no weeds in the field, hence the reason for complete harvesting with the harvester. An average yield of three thousand pounds per acre was obtained.

Corn Fertilizer Trial - R.D. 829

Summary

An open pollinated yellow corn (VS550A) from Mexico was yield treated at Central Farm and Stann Creek using three levels of Nitrogen, Phosphorous and Potassium. The results obtained show that:-

- i) On the Chenchem black clay soil at the Horticultural Section, Central Farm, as the phosphate levels increased the yields decreased when no nitrogen or potassium is added to the soil.
- ii) The optimum level of fertilization for this soil type is at N_4 and P_1 .
- iii) On Red Bank sandy loam soil at Riverside area, Central Farm there was not much increase in yield due to increased fertilization.
- iv) Yields obtained from the trial at Stann Creek Agstat were quite varied because of water-logging in the rainy season and stress during the drought.

Materials and Method

Sample plots at the Stann Creek Agstat measured 38' x 3' (1/382 ac.) and at Central Farm measured 30' x 6' (1/254 ac/) All the sites were ploughed, harrowed and rotovated by way of preparation and hand dusted with Aldrin (40% wettable powder) at the rate of 2 lbs per acre as a control measure against soil-borne insects.

Both the trial at Riverside area and that at the Horticultural Section received the same type of fertilizer treatment at the same rate as indicated below:-

Sulphate of ammonia at 200 lbs and 400 lbs per acre equivalent
Triple superphosphate at 100 lbs and 200 lbs per acre equivalent
Muriate of potash at 100 lbs and 200 lbs per acre equivalent

Potash was supplied from potassium sulphate in trial at Stann Creek Agstat because of the unavailability of muriate of potash, nitrogen and phosphate were the same as shown above. Fertilizers were hand broadcasted evenly over the appropriate plots.

At all three sites plots were thinned to one plant per hole and in the replications at Central Farm empty spots were resupplied with plants transplanted from the guard rows. Armyworm (Laphygma frugiperda) was observed at the Riverside and Stann Creek trials, and spraying done with Telodrin at 60 ccs, and 70 ccs. respectively per 3 gallons of water. Weed control was effected by hand-weeding and spraying with 2, 4D and Gramoxone.

Results and Discussions

Poorest germination (50%) was obtained in the replication at the Stann Creek Agstat; a germination percentage of ninety-five(95) was obtained at each of the other two sites.

Reference to Tables I, II and III will show that the lowest overall yields were also obtained from the Stann Creek Trial. It has been recorded that this particular trial was making unsatisfactory growth during mid-July because of a spell of dry weather. These plants developed a spindly appearance and had to be moulded up, even so a large number was blown down by heavy winds experienced in August. These plants eventually had to be given artificial supports. Consequently it should be expected that yields would have been adversely affected.

TABLE I

YIELDS OF CORN FERTILIZER TRIAL - STANN CREEK IN CWT/ACRE

	P ₀				P ₁				P ₂			
	K ₀	K ₁	K ₂	Total	K ₀	K ₁	K ₂	Total	K ₀	K ₁	K ₂	Total
0	14.3	3.1	22.2	39.6	32.7	16.2	21.0	69.9	3.6	14.3	21.5	39.4
2	21.5	19.8	4.3	45.6	11.7	6.4	28.9	47.0	19.8	18.9	14.8	53.5
4	15.0	14.6	6.9	36.5	16.2	26.5	34.1	76.8	29.1	18.6	17.9	65.6
	50.8	37.5	33.4		60.6	49.1	84.0		52.5	51.8	54.2	

TABLE II

YIELDS OF CORN FERTILIZER TRIAL - HORTICULTURAL SECTION
IN CWT/ACRE

	P ₀				P ₁				P ₂			
	K ₀	K ₁	K ₂	Total	K ₀	K ₁	K ₂	Total	K ₀	K ₁	K ₂	Total
0	33.0	32.5	45.7	111.2	29.0	37.2	21.5	87.7	26.8	36.5	28.4	111.7
2	35.0	38.4	23.6	97.0	25.3	38.1	23.1	86.5	28.9	25.3	28.1	82.3
4	31.2	40.0	45.0	116.2	45.0	34.3	33.0	112.3	32.1	28.4	35.0	95.5
	99.2	110.9	114.3		99.3	109.6	77.6		87.8	90.2	91.5	

TABLE III

YIELDS OF CORN FERTILIZER TRIAL - RIVERSIDE AREA IN CWT/ACRE

	P ₀				P ₁				P ₂			
	K ₀	K ₁	K ₂	Total	K ₀	K ₁	K ₂	Total	K ₀	K ₁	K ₂	Total
N ₀	42.6	47.0	33.8	123.4	43.1	36.3	31.1	110.5	36.9	46.5	28.1	111.5
N ₂	38.9	37.1	42.6	118.6	36.3	40.6	38.9	115.8	38.6	38.6	30.7	107.9
N ₄	41.0	36.3	39.5	116.8	39.9	36.9	46.4	123.2	45.4	37.5	35.7	118.6
	122.5	120.4	115.9		119.3	113.8	116.4		120.9	122.6	94.5	

Key: N₀ - 0 lbs. Sulphate of Ammonia/Acre - 21% N

N₂ 200 lbs " " " "

N₄ 400 lbs " " " "

K₀ 0 lbs Muriate of Potash/Acre - 60% K₂O

K₁ 100 lbs " " " "

K₂ 200 lbs " " " "

P₀ 0 lbs Triple Superphosphate/Acre - 46% P₂O₅

P₁ 100 lbs " " " "

P₂ 200 lbs " " " "

It is believed that higher yields would certainly have been given at the Horticultural Section were it not for the heavy damage inflicted by raccoons on young cobs. The trial at Riverside area grew well and gave the highest overall yield having suffered no significantly adverse weather or other extraneous conditions.

Conclusion

Because of the extraneous factors which assumedly interfered with the results obtained from the Stann Creek Agstat trial and the replication at the Horticultural Section, the final yield results require further testing for confirmation. In fact, such interference is very likely to have so influenced crop stand and production as to make insignificant differences between treatments seem significant and vice-versa.

It is hoped that experiments of a like nature will be laid down in 1969 and further treatments included as extrapolated from this year's results.

Highest yield at the Stann Creek Agstat was obtained with a fertilizer treatment combination of 400 lbs per acre sulphate of ammonia, 200 lbs per acre potassium sulphate and 100 lbs per acre triple superphosphate (T SP) this yield was not, however significantly greater than that received from a single fertilizer treatment of 100 lbs TSP alone, taking into consideration the cost of the extra fertilizer element.

A yield of approximately 4,600 lbs per acre was obtained from corn planted on Chenchem black clay and receiving only muriate of potash at 200 lbs per acre. The nearest comparative yield figure (4,500 lbs per acre approximately) was given by treatment combination of 400 lbs per acre sulphate of ammonia and 200 lbs per acre muriate of potash.

Corn variety Trial

Summary

A corn variety trial was laid down at Riverside area, Central Farm to test yields under a standard fertilizer treatment. Two hybrid varieties - 302 and 304 were planted along with the open pollinated VS550A and 001.

The results obtained indicated that:-

1. The highest number of double cobs per acre was obtained from the variety 304.
2. The open-pollinated variety VS550A gave lowest yield of double cobs per acre and lowest overall yield of cobs per acre.
3. The highest overall yield of cobs was given by the hybrid variety 304.

Materials and Method

The trial was planted on June 4th and fertilized two days later, using 18:46:0 at 200 lbs per acre equivalent and muriate of potash (KCl) at 100 lbs per acre equivalent. Before the laying down of the experiment design the area was cleared of debris, ploughed, harrowed and rotovated; hand dusting was also carried out with Aldrin (40% wettable powder) at the rate of 2 lbs per acre equivalent for the control of soil-borne insects. Experimental plots measured 1/126 acre and sample plots 1/382 acre; plants were spaced at 3 feet apart between rows and 1 foot apart within the row.

Control of annual and perennial grasses was effected by spraying with Gramoxone at a rate of 2 pints per acre, broadleaf weeds were controlled by hand weeding. Spraying had to be carried out twice against armyworm (*Laphygma frugiperda*) using Telodrin at 60 ccs. per 3 gallons of water.

Results and Discussions

The germination percentage in some of the plots were rather low because of damages by black birds and racoon. Replanting was required in order to obtain a higher percentage stand. Despite the action, however, the germination percentage for the variety 302 still remained at zero, indicating it to be non-viable. The original and final percentage stands for the four varieties were as indicated below:-

<u>Variety</u>	<u>Original Germination Percentage</u>	<u>Final Stand Percentage</u>
001	45	95
302	0	0
304	50	91
VS550A	60	98

Somewhat severe damages were occasioned to the corn leaves by the delphacid insect, a large number of necrotic brown spots developed on the leaves thus reducing the photosynthetic area of the leaves.

TABLE IV
Yield Per Acre of Single and Double Cobs

<u>Variety</u>	<u>Single Cobs per acre</u>	<u>Double Cobs per acre</u>	<u>Total No. of Cobs per acre</u>
001	22,538	3,820	30,178
302	0*	0*	0*
304	21,774	4,584	30,942
VS550A	23,684	3,056	29,796

* Seed did not germinate

The figures in Table IV show that the best performance was obtained from the hybrid variety 304. The variety, however, also had a high number of tips which were not covered by the husk. As such it is more susceptible to damage by insects which can easily enter the ear at this point.

Conclusion

From the results obtained it would appear that the variety 304 is a better yielder than the other varieties tested. The occurrence of uncovered tips may, however, reduce the yield of whole grain of good quality.

Dent Corn (N & P) Fertilizer Trial:-

Summary

A variety of yellow dent corn (VS 550A) from Mexico was planted at the Horticultural Section on Chenchem black clay to test its responses to Nitrogenous and Phosphatic fertilizers and its performance during the cool months of this country.

The results obtained were variable due to water-logging and cattle damage, but it appears that:-

1. Corn can be grown quite successfully outside the so-called "corn season" (May - September)
2. Sixty-four pounds of nitrogen and 46 pounds of phosphorus pentoxide will give yield of 5,000 lbs/acre.
3. There seems to be an interaction between application of nitrogen and phosphorus. Yields tend to increase with each increment of phosphatic and nitrogenous fertilizers.

Materials and Method

The trial was carried out on Chenchem black clay soil at the Horticultural Section in Central Farm. The sample plots were 6 feet by 30 feet (1/240 acre) with guard rows surrounding each plot to prevent fertilizer interaction. The area which was 90 feet by 156 feet was dis-ploughed once and harrowed twice with a Massey Ferguson tractor and implements to give a medium fine tilth.

The area was levelled by hand in order to facilitate planting which was also done by hand. Just before planting, the area was dusted with 2 lbs/acre equivalent of 40% W.P. Aldrin to control soil-borne insects and fire ants (*Solenopsis xyloni*).

There were thirteen treatments replicated three times using a Randomized Block design.

Twelve combinations of nitrogen and phosphorus fertilizers (per acre equivalent) were applied per plot:-

Urea - (Nitrogen - $N_{43\%}$) 0 lbs., 100 lbs., 150 lbs and 200 lbs
Triple Superphosphate (Phosphorus $P_2 O_5$ - 46%) 0, 150, 200 and 250
Muriate of potash (Potassium - $K_2 O$ - 60%) 100 lbs

Dent corn (Zea Mays variety VS550A) from Mexico was hand planted 3 feet by 1 foot apart approximately 1 - 2" deep. A basic dressing of 100 lbs muriate of potash ($K_2 O$ - 60%) equivalent per acre was broadcasted on the entire block. Nitrogen and phosphorus fertilizers in the form of Urea and triple superphosphate respectively were broadcasted on their appropriate plots at the specified rate.

Results and Discussions

During the early part of the growing season, some of the plots were damaged by cattle. This caused a retardation in growth with the ultimate effect on yield.

There were also a few plots which suffered from water-logging. This effect was not anticipated as the crop was grown out of season during the dry season. Control of moisture was in effect when possible; however with a heavy rain during the growing period, temporary oxygen deficiency was experienced.

Damage by armyworm(*Laphygma frugiperda*) were observed on the 22nd December, 1967. The plots were immediately sprayed with Didimax (25% DDT) at the rate of 2 fl. oz. /3 gal. water (1 qt. per acre) Observations made on the 29th December showed the spraying to be 95% effective.

Since these three factors affected the results to such an extent, it is not possible to make any definite statement in respect to the fertilizer requirements.

TABLE V
YIELDS OF CORN IN CWT/ACRE

Treatments	Block I	Block II	Total	Average
Control	46.1	44.4	90.5	45.2
11	40.8	40.7	81.5	40.7
12	45.6	45.1	90.7	45.3
13	23.3*	28.7*	52.0	26.0
14	29.3 ^o	25.9 ^o	55.2	27.6
21	57.0	57.0	114.0	57.0
22	46.8	46.9	93.7	46.8
23	47.3	47.4	94.7	47.3
24	54.1	54.9	109.0	54.5
31	49.5	52.9	112.4	56.2
32	38.9 ^o	38.7 ^o	77.6	38.8
33	39.3	39.1	78.4	39.2
34	54.3	59.7	114.0	57.0

Key: 1:1 - 43 lbs. N / 46 lbs. P₂O₅ per acre

2:2 - 64 lbs N / 69 lbs P₂ O₅ per acre

3:3 - 86 lbs N / 92 lbs P₂ O₅ per acre

3:4 - 86 lbs N / 115 lbs P₂ O₅ per acre

^o means waterlogged plots

* means cattle damage

Conclusion

From the results obtained 150 lbs peracre urea and 100 lbs triple super-phosphate gave the highest yield, 1,200 lbs per acre more than the control. The yield from this treatment may not be the best practical level for this type of soil. However, due to the damages caused by cattle and waterlogging on some of the plots maximum return from the treatments was not possible.

Rice

Rice Variety Trial - Mile 20, Western Highway

Summary

Twenty-one rice varieties were planted at Mile 20 along the Western Highway to determine the variety with the best quality and highest yield. The varieties planted were:-

IR-5, Nilo 47, IR 4-93, IR 52-18, IR 400-5, B581A6-545, IR-154, Nilo 48, IR 127-80, Milfor-6, B572A3-47, IR-8, Nilo 3, IR 160-27, IR 532-1, B581A6, B5580, C4-63, B572A3, IR 76-45, IR-154-61.

From the yield of cleaned rice it was seen that varieties giving the highest yield were IR 160-27, Nilo 3, IR-8 and Milfor-6. Overall yield, however, was quite low.

Materials and Method

This trial was laid down on the silty sand of the Coastal Pine Ridge on 5th August. The plots measured 40 ft. by 27 ft. (approximately 1/40 acre). The entire area was ploughed and harrowed before the laying out of the experimental design. All varieties were fertilized with Triple superphosphate, sulphate of ammonia, and muriate of potash each at the rate of 187 lbs per acre hand broadcast evenly over the area.

Germination percentages varied widely among the varieties of rice planted from as low as 0% for IR 154-61 to as high as 85% for Nilo 3. As a result the seven varieties giving the best germination were resupplied with seeds. The varieties giving extremely low germination were not replanted but scattered plants transplanted in a concentrated area. The varieties which at the first planting gave germination percentages ranging between 50% and 85% were:-

Milfor - 6(60%), IR-8 (55%), C4-63 (50%), Nilo 3 (85%), IR-5 (50%)

Results and Discussions

At the early stage of this trial weather conditions were unfavourable and as a result growth was delayed and germination poor in most of the varieties, irrigation was also inefficient. Though resupplying was done in some cases the plots were not growing under optimum density. As such it may be observed from consulting Table VI and TABLE VII that almost all the varieties that were resupplied gave the better yield. It should be noted, however, that IR 400-5 which was not replanted and yielded from a 25% stand gave a higher yield than IR-5 resupplied to a 100% stand.

TABLE VI

Germination Percentages of Rice Varieties

<u>Variety</u>	<u>Actual Germination %</u>	<u>Final % Stand After Supplying</u>
IR-5	50	100
IR-154	1	-
IR-8	55	95
Milfor-6	60	100
B572 A3	2	-
Nilo-3	85	100
Nilo-47	5	-
Nilo-48	5	-
B581 A6	4	-
IR 4-93	10	-
B572 A3-47	2	-
IR 127-80	10	-
IR 400-5	25	-
IR 76-45	2	-
B581 A6-545	0	-
IR 160-27	35	85
IR 52-18	5	-
IR 154-61	0	-
IR 532-1	35	95
C4-63	50	85
B5580	10	-

TABLE VII

Weight of Cleaned Rice

<u>Variety</u>	<u>Weight/Plot</u>		<u>Weight/Acre</u>
	lb.	oz.	lb.
IR-160-27	27	6	1,095
IR 400-5	18	11	748
B581A6-545	1	13	73
IR- 76-45	3	13	153
IR-1278-80	7	7	298
B572A3-47	6	3	248
LR 154	2	14	116
Nilo 3	26	9	1,063
B5580	5	13	233
IR532-1	12	5	493
IR 154-61	1	1	40
IR 52-18	11	10	466
IR-8	22	5	893
IR -5	18	7	738
C4-63	19	4	770
Milfor-6	20	10	826
IR 4-93	12	14	516
B572A3	3	10	146
Nilo 47	13	2	525
B58186	7	11	308
Nilo 48	11	6	455

Insect infestation was not severe and slight damage was caused in only a few plots. The stem borer (*Rupella albinella*) was noticed to be infesting the following varieties: Nilo 48, IR 4-93, IR 160-27, IR 532-1, IR 52-18, IR 8. The entire block was sprayed with a mixture of Telodrin and Sevin to control this infestation and with Forénox to control brown leaf spot, a fungal disease. As a point of interest observation in November showed a slight infestation of brown leaf spot on the panicles of all varieties except those of C4-63. Though there was an indication on the leaves of C4-63, the spikelets were solid and free from injury.

Conclusion

It is unfortunate that germination percentages should have been so low as to omit the amount of valuable information which would otherwise have been obtained from this trial. Of course, extrapolated values could be obtained for plots which had extremely low germination but such values would not be realistic since this would disregard the factors of competition which tend to make connection between density and yield not quite a linear relationship.

A consideration of the yields obtained from varieties occupying resupplied plots produces a rating as follows in descending order of magnitude:-

IR 160-27, Nilo 3, IR-8, Milfor -6, C4-63, IR-5

It is of particular interest to note, however, that whereas the yields of IR-5 and IR-400-5 are not significantly different the former produced its yield from a resupplied 100% stand and the latter from an original 25% stand which was not resupplied.

It is hoped that more complete information will be obtained from the replication of this trial at Central Farm where varieties germinated well, generally. Harvesting is in progress at the time of the writing of this paper.

Rice Variety and Fertilizer trial - Mile 20, Western Highway

Summary

Three varieties of rice (Nilo-47, IR-8, IR-5) were yield tested at Mile 20 on the Western Highway using the three major nutrients at two levels.

From the result obtained it was found that:-

1. The IR-8 variety gave the highest yield, but Nilo 47 was of much better quality having suffered less damage by *Helminthosporium oryzae*, the fungus responsible for Brown Leaf Spot.
2. The N_4 level of Nitrogen at K_1P_2 rate gave the highest yield - 3,630 lbs per acre.
3. Poor water control during the growing season caused tremendous retardation in growth on the IR-5 and IR-8 varieties.
4. $N_2P_2K_1$ level of fertilization gave the highest and best quality of rice with Nilo 47.
5. Severe drought caused IR-5 variety to mature unevenly.
6. Low yield and poor quality of both IR's were due to water stress.
7. The two varieties suffered from brown leaf spot *Helminthosporium oryzae*.

Materials and Method

The trial was carried out on the silty sand soil type at Mile 20 along the Western Highway, the area was prepared by ploughing and harrowing. The trial was laid out according to a completely randomized design without replication, this being due primarily to a shortage of seeds.

The three rice varieties, Nilo 47, IR-8 and IR-5 were planted and fertilized with different levels of nitrogenous, phosphatic and potassium fertilizers to test their responses to these different levels of fertilizers. The fertilizers used were urea, triple superphosphate (T.S.P.) and muriate of potash applied at the following rates:- Urea at 50, 100, 200, 100 lbs. per acre equivalent and represented by N₃, N₁, N₂, N₄ respectively; T.S.P. at 100 and 200 lbs. per acre equivalent and represented by F₁, F₂ respectively; Muriate of Potash also at 100 and 200 lbs. per acre equivalent and represented by K₁ and K₂ respectively.

Nitrogen fertilizer was applied at different rates at the different developmental stages of the plants. The N₁, N₂, F₁, F₂, K₁, K₂ levels were all applied at time of planting on the appropriate plots; hand broadcasting was used in all cases. The N₃ level was applied at four and at eight weeks after germination while the N₄ level was applied at two weeks before booting.

The following is a key for the fertilizer treatments given to all three varieties:-

N ₁	-	100 lbs.	Urea at time of planting.
N ₂	-	200 "	" " " " " "
F ₁	-	100 "	Triple superphosphate at time of planting.
F ₂	-	200 "	" " " " " "
K ₁	-	100 "	Muriate of potash at time of planting.
K ₂	-	200 "	" " " " " "
N ₃	-	50 "	Urea 4 weeks after germination and 8 weeks after germination.
N ₄	-	100 lbs.	Urea 2 weeks before booting.

Results and Discussions

Insect Infestation

The entire trial was infested with stem borers (Rupella albinella) which more severely attacked the Nilo 47. These were controlled by spraying with Metasystox at the rate of 84 cc./3 gallons of water, Toledrin at the rate of 70 cc./3 gallons of water and Sevin at 6 oz. per 3 gallons of water, all of which were effective.

Diseases

There was an outbreak of Brown Leaf Spot caused by the fungus Helminthosporium Oryzae which attacked plants of all ages. The seedlings were attacked, causing the typical dark brown, oval spots of necrotic tissue to appear on leaves and sheaths. Older plants had these spots on leaves, necks, hulls and kernels. This disease was severe in the IR-5 and IR-8 varieties, but these were sprayed with Perenox as a control measure.

Growth Performance

The variety Nilo 47 showed better growth than the other two varieties throughout the life cycle. The other two varieties IR-8 and IR-5 were stunted in growth thus proving the Nilo 47 more tolerant of the hardy conditions experienced at this particular site. Despite the fact that the Nilo 47 showed good growth, the other two varieties gave more panicles per stool; this fact may in no small measure account for the generally higher yields obtained from IR-8 as compared to the Nilo 47.

Harvesting

All the rice was harvested by hand. The variety Nilo 47 was harvested first. The other two varieties were harvested a bit too late, and as a result many panicles fell to the ground and were eaten by rats.

TABLE VIII

Yield of Rice Variety and Fertilizer Trial
in Cwt/Acre

Code	Nilo 47	IR-8	IR-5	Total
N ₁ P ₁ K ₁	14.0	19.4	5.7	39.1
N ₁ P ₁ K ₂	7.8	20.1	5.4	33.3
N ₁ P ₂ K ₁	12.5	18.8	3.6	34.9
N ₁ P ₂ K ₂	6.3	22.8	5.8	34.9
N ₂ P ₁ K ₁	8.8	22.7	14.3	45.8
N ₂ P ₁ K ₂	10.4	20.7	2.0	33.1
N ₂ P ₂ K ₁	6.8	16.6	5.4	28.8
N ₂ P ₂ K ₂	6.5	23.5	3.7	33.7
N ₃ P ₁ K ₁	12.0	18.7	3.1	33.8
N ₃ P ₁ K ₂	8.3	23.5	4.8	36.6
N ₃ P ₂ K ₁	10.4	22.2	3.8	36.4
N ₃ P ₂ K ₂	14.8	30.7	3.7	49.2
N ₄ P ₁ K ₁	11.8	6.1	10.2	28.1
N ₄ P ₁ K ₂	12.1	22.3	5.3	39.7
N ₄ P ₂ K ₁	9.2	36.3	4.8	50.3
N ₄ P ₂ K ₂	7.0	19.9	5.5	32.4
Total	158.7	344.3	87.1	

Yield performance

Reference to Table VIII shows that undoubtedly the rice variety IR-8 gave the best overall yield and the highest individual yield. With only one exception (i.e. in treatment N₄P₁K₁) IR-8 consistently gave better yields than IR-5 and Nilo 47. It should also be noted that highest overall yield from fertilizer treatment was given by the N₃P₂K₂ and N₄P₂K₁ combinations, no significant difference existing between these two treatment yields. It should also be noted that the latter of these two fertilizer treatments gave the highest individual yield over the entire trial (along with IR-8) and the former the second best yield (also along with IR-8).

Conclusion

There was a marked difference in the yield performance of the three rice varieties used in this trial with IR-8 giving the highest overall variety yield, Nilo 47 ranking second and IR-5 third. The performance of IR-8 is particularly noteworthy since, as was mentioned above, some seeds were lost as a result of late harvesting.

/The highest

The highest yields were approximately equal to 3,600 lbs. per acre obtained from IR-8 with an $N_4P_2K_1$ fertilization treatment and 3,100 lbs. per acre also obtained from IR-8 with a fertilizer treatment of $N_3P_2K_2$.

It can be concluded, therefore, that IR-8 has undoubtedly been proven the most outstanding variety in this trial. Also, fertilizer treatments $N_4P_2K_1$ and $N_3P_2K_2$ were shown to have greatest influence on yield of rice.

Rice Variety Trial - Stann Creek

Summary

Seven rice varieties from the Philippines were yield tested at Stann Creek to determine the yield, potential insect and pest resistance and quality.

The varieties were grown under upland condition; from the results it would appear that:-

1. All IR varieties tried are must higher yielding.
2. Due to insufficient water, yields from all varieties are far below normal.
3. Milfor-6, IR-8, IR-154 and B5580 are susceptible to Hoja Blanca virus.

Materials and Methods

This trial was carried out on the Stann Creek Agricultural Station on land which was ploughed and harrowed before the laying out of the plots. The plots were laid down according to a completely randomized block design, each variety in a block occupying a plot measuring approximately 1/100 acre. Prior to planting the entire experimental design was hand-dusted with 40% W.P. Aldrin at the rate of 2 lbs./acre equivalent for the control of soil-borne insects.

The plots were fertilized in two separate instances. On the day of planting urea, triple superphosphate, and potassium sulphate were applied at the respective acre equivalent rated of 100 lbs./acre, 125 lbs./acre, and 100 lbs./acre. Urea was again applied at the rate of 50 lbs./acre equivalent just two weeks before shooting; this occurred at two months after planting. All fertilizers were evenly broadcasted by hand over the individual plots. Hand-weeding of grasses and broadleaf species was necessary on two occasions during the crop growth.

Results and Discussions

Originally eight varieties of rice were planted. Germination percentages were quite reasonable in all varieties with the exception of Nilo 47 which did not germinate probably because of poor seed quality. For this reason this variety was excluded from the trial; and only seven varieties were yield tested. Reasonably good growth rate was observed in all the varieties and reference to Table IX will solicit information on average heights, weight of panicles, length of panicles, number of tillers per stool, number of panicles per stool and yield.

An analysis of variance has shown that the yield variation between the varieties was generally inherent in the differences between these varieties. Correlation coefficients were also computed to determine whether yield was influenced in anyway by the characteristics of plant height, tillering capacity and length of panicles. Indications are, as shown in Table IX, that none of these factors could be said to have directly affected the yield of any variety. According to the correlation coefficient that was found in comparing yield and percentage germination/stand ($r = 0.77$) it was shown, nevertheless, that there was some influence of plant density on the yield obtained, that is, quite a proportion of the differences in variety yield may have been caused from differences in density of plant stands.

Some of the rice varieties were attacked by the fungus causing Brown Leaf Spot, and four varieties showed symptoms for the virus disease Hoja Blanca. These latter were Milfor-6, IR-8, IR-154 and B5580. A high level of blast infestation was also noted in the three B varieties.

TABLE IX

Performances of Phillipinos Rice - Stann Creek

Varieties	Average yield	Average Height	Average Weight Panicles	Average Length Panicles	Av. No. of tillers/stool	Av. No. Panicles per stool
Milfor-6	6.9 cwt/ac.	39 ins.	51 gms.	11 ins.	14	13
B581-A6	.6 " "	29 "	17.5 "	7 ins.	8	8
B5580	2.1 " "	31 "	27.5 "	10 "	11	11
IR-154	25.8 " "	28 "	34.0 "	9.4 "	11	11
IR-8	23.3 " "	29 "	38.0 "	9.2 "	11	11
IR-5	15.6 " "	32 "	79.7 "	8.6 "	27	27
B572-A3	2.0 " "	31 "	27.5 "	10. "	11	11

Conclusion

Varieties IR-154, IR-8 and IR-5 gave satisfactory yields in the typical upland conditions in which they were planted where no water control was possible. These varieties, however, were found to be susceptible to Brown Leaf Spot fungus and Hoja Blanca disease. Infection by Brown Leaf Spot experienced in the three varieties mentioned above was slight and occurred late during crop growth; thus, yields were not severely affected.

The poor yields obtained with varieties B5580, B572-A3 and B581-A6 could be attributed to two factors. First of these may be referred to as severe infestation by the insect Blissus Leucopterus which in conjunction with a fungus of the Piricularia spp. caused a high percentage of blasted rice. Secondly, there is the likelihood that the percentage rice stand in these three B varieties prevented the full use of the land to the extent that yield figures were pulled down noticeably.

DRY BEANS

Red Kidney Bean Chemical Weed Control Trial

Summary

Four herbicides, dalapon, bexone, 2,4-D and Lorox, at three levels were applied to California Red Kidney in December 1967 to determine their effectiveness in controlling weeds of the broad-leaf and grass species (Euphorbia, Cyperus and Enchinochloa spp.)

From the results obtained it was found that:-

- Lorox at the highest level of application 6lbs./acre was the most effective in controlling broad-leaf weeds of the Euphorbia sp. However, the highest yield was obtained with the application of 4 lbs. per acre lorox equivalent.
- Dalapon (gramevin) treated plots caused a reduction in yield and discoloration of seed coat. In addition the cotyledons and testa on some of the bean were not fully developed.

Materials and Method

This experiment was carried out on a brown silty loam soil at Central Farm. The plots were 8 ft. x 30 ft. (approximately 1/180 acre). The area (92 ft x 116 ft) was disclowed and horrowed to give a medium fine tilth. It was levelled by hand in order to facilitate planting which was also done by hand. Just prior to planting the area was dusted with 2 lbs./acre equivalent of 40% W.P. Aldrin to control soil-borne insects and fire ants (Solenosis xyloni).

There were twelve treatments replicated thrice using a randomized block design. Lorox, was applied as a spray after planting, but before the crop emerged. It was intended that gramoxone be used, but unfortunately 2,4-D-amine was used instead; this herbicide was applied with the aid of a shield to keep it off the crop. Dalapon and Bexone were both applied as selective herbicides.

R. K. Beans (Phaseolus vulgaris) seeds from California in the United States of America were planted two feet between rows and four inches between plants in hole 1-1½ inches deep. Two seeds were placed in each hole. After germination, the seed-lings were rogued one week later to one seedling four inches apart. A basic dressing 90 lbs. Urea (43% N), 150 lbs. triple super-phosphate (46% P₂O₅) and 90 lbs. Muriate of potash (60% K₂O) per acre equivalent was applied to each plot at the time of planting. Guard rows surrounded each plot from which seedlings were obtained for replacement if required.

Results and Discussions

Excellent plant growth and germination percentage were achieved during the early stages of growth. A temporary dormancy was observed in late December and early January due to dry weather condition.

Damage by "Mexican bugs" (Diabrotica diabolheata) was observed during late December. The plots were immediately sprayed with sevin at the rate of 2 lbs. per acre; this gave a control of 95%.

There was a continuous decrease in weed population with an increasing concentration of Lorox (e.g. from 2 lbs. to 6 lbs./acre). The L₁ plots (2 lbs./acre) had the highest weed population and the L₂ and L₃ plots the yield per acre for the L₁ was less than that of the L₂ (4 lbs./acre). This reduction in yield can be accounted for by the greater weed competition in the L₁ plots. However, the difference in weights is of no significant value.

The L₃ plots although almost free of weeds, with the exception of few patches of nut grass, yielded less than that of the L₂ and L₁. This can be attributed to a greater residual effect of Lorox which suppressed the uptake of certain essential minor elements which later lead to the following symptoms:-

- (i) Stunted growth
- (ii) Yellowing of the main leaf veins
- (iii) Drying of the leaf between the main veins, tips and margins.
- (iv) Abscission of the leaflets at the advanced stages.
- (v) Dying of the plants.
- (vi) Reduction of yield.

Da lapon

The Dalapon treated plots gave a reduction in yield as the concentration increase. All weeds recovered the effects four days after spraying; therefore the weed competition for nutrients and soil moisture can be considered

to be the same in all the D treated plots. At a concentration of 4 lbs. to 6 lbs./acre there appeared a reduction of red pigmentation of the testa to a more pale pink colour. In addition the cotyledons and testa or some of the grains were not fully developed. In certain instances grains can be observed with testa fully covering the cotyledons.

M.C.P.B. (Bexone)

All the Bexone treated plots recovered the effects four days after spraying. There appeared no abnormalities, and slight differences in weights with the varying concentrations 1 to 2 lbs./acre must be due to competition by weeds at varying degrees. A micro-climate must have developed in each plot which influenced growth and productivity of the plants.

2,4-D (Amine)

This chemical was not intended for this trial but was accidentally applied in place of Gramoxone. The concentrations used were 15 to 2 pts/acre. According to observations made four days after spraying about 80% of the broad-leaf weeds were still lodging in the G₁ plots; 90% in the G₂ and G₃ plots were affected by the spray and showed severe curling and bending of the upper shoot which was still undergoing the process of elongation. The formation of adventitious roots was noticed on leaf petioles and stem on all the treated plots. The growth rate of the G₁ treated plots 5 pts. 2,4-D/acre recovered from the effects of the chemical before the G₃ plots 2 pts./acre which took fourteen days. A reduction in yield, a mere 258 lbs. 12 ozs./acre, occurred in the G₃ plots.

The development and maturity of the pods was also delayed by this chemical. The G₂ plots yielded 675 lbs./acre and the unaffected G₁ plots 1,012 lbs./acre which is quite satisfactory.

Control

These plots received no chemicals whatsoever and the yield per acre resulted to be 978 lbs. 12 ozs. which is much more than that of the Dalapon treated plots which apparently had some effects on the normal development of the seeds. Weed competition for sunlight, moisture and soil nutrients to some extent can be the cause of the low yields obtained in the control plots.

TABLE X

Yields of R.K. Bean Chemical Weed Control
Trial 1967/68 cwt./acre

Code	Block I	Block II	Block III	Total	Average
L ₁	13.9	10.3	9.8	34.0	11.3
L ₂	12.1	10.2	12.4	34.7	11.6
L ₃	10.1	11.4	8.4	29.9	10.0
D ₁	9.0	7.4	5.5	21.9	7.3
D ₂	8.2	7.2	4.9	20.3	6.8
D ₃	5.7	6.6	4.9	17.2	5.7
M ₁	13.9	10.2	9.1	33.2	11.1
M ₂	11.4	9.3	6.7	27.4	9.1
M ₃	13.0	10.6	8.1	31.7	10.6
G ₁	13.4	11.0	5.9	30.3	10.1
G ₂	8.5	7.6	3.9	20.0	6.7
G ₃	4.7	3.1	3.3	11.1	3.7
Control	12.7	9.0	7.6	29.3	9.8

Key: L₁ L₂ L₃ - 2, 4 and 6 lbs. lorox per acre
D₁ D₂ D₃ - 3, 4 and 6 lbs. Dalapon per acre.
M₁ M₂ M₃ - 1, 1.5 and 2 lbs. Bexone per acre.
G₁ G₂ G₃ - .5, 1 and 2 pts. 2,4-D per acre.

Conclusion

Lorox as a pre-emergence herbicide has been found quite adequate against broadleaf weeds at a concentration of 6 lbs. Lorox/acre. At this concentration there was no effects to the weeds of the Gramineae family. In addition at concentration 4 lbs. and 6 lbs./acre there appeared symptoms of minor element deficiencies which in the acute stages lead to the dying and abscission of the leaflets.

The Dalapon treated plots gave very low yields at concentration 3 to 6 lbs./acre. The plants at all stages of growth looked rather green and healthy. The seeds however when reaped showed a destruction of the red pigmentation (a bleeding effect). In addition undeveloped testa and cotyledons were observed in certain instances. At the concentrations mentioned above there were no effects on either broadleaf weeds or grasses.

The 2,4-D treated plots at concentrations of .5 to 2 pts./acre had slight effects on weeds. It caused lodging and curling of the shoots of broadleaf weeds, but no effects to the grasses. Damage caused to the bean plants was quite severe at the concentration of 1 to 2 pts./acre. There was formation of adventitious roots on petioles and stems, with bending and curling of the shoots which were still undergoing elongation. Abnormal development of the stem to very much enlarged size was also noticed at concentration 1 and 2 pts./acre. There was also a delay in maturity as the concentration increased. The yields also decreased with increasing concentration. It was found that at .5 pt/acre there was a distinct green colour.

SOYABEANS

Soybean (Glycine max) Variety and Time of Planting Trial

Site:- Riverside Area, Central Farm.

Design:- Completely randomized block with four replicates.

Planting Date:- 16th Day of each month or as soon as possible thereafter.

Pre-planting Cultivations:- Ploughing
Harrowing.

Fertilizer Applications:-

- (a) Type: 18-46-0 and muriate of potash (KCl)
- (b) Rate: 18-46-0 at 200 lbs./acre; KCl at 100 lbs./acre.
- (c) Method: Hand broadcasted over each plot.

Insect Control:- Dusting with Aldrin at the rate of 2 lbs./acre for control of soil-borne insects.

TABLE XI

Average Yield of Dry Soy Beans (Cwt./Acre)

Variety	April 1968	May 1968	June 1968	July 1968	August 1968	September 1968	October 1968	Total
Improved Pelican	3.5	7.3	25.2	No planting; month too wet.				
Blanca	4.1	6.4	12.5		14.9	20.1	39.5	97.5
San Pable	5.0	7.8	13.6		-	-	-	26.4
Hampton	5.2	4.1	10.9		5.1	10.9	15.8	52.0
Hill	3.7	3.4	16.3		10.2	11.3	23.3	68.2
Lee	3.7	5.7	13.4		8.0	10.0	17.4	58.2
Davis	3.4	5.8	-		7.2	7.4	3.2	27.0
Coker 240	-	-	-		13.9	9.6	14.0	37.5
Total	28.6	40.5	91.9		77.7	86.7	153.8	

Soybean Trial - April

Results and Discussions

The yields obtained from the trial laid down in April are quite low. The highest average yield per acre of 5.2 cwt./acre was produced by Hampton, and the lowest was obtained from Davis. Both these varieties were obtained from U.S.

In the latter part of April, all the varieties were showing symptoms of iron deficiency; this and the time of planting may be the factors which account for such low yields. Iron sulphate was sprayed on the leaf foliage at 100 ppm. concentration and this rectified the deficiency of iron.

Because of the dry experienced during April and May it was necessary to irrigate the trial, by means of overhead sprinkler, six times. The irrigation began on the 17th April and finished on the 16th May.

There was a severe attack of Diabroticas in late April and so the plots were sprayed with Telodrin at the rate of 60 ccs./3 gallons H₂O on the 5th June. This, however, did not give complete control and as such Melathion was sprayed at the same rate on the 8th May. Crown rot fungus was observed in the plots and Perenox at 6 oz./3 gallons water was sprayed to control it. This application gave excellent control.

Diabroticas, however, continued to be the main pest of this trial and Metasystox was sprayed on 21st and 28th of May before complete control was achieved.

Of the seven varieties planted in April, Blanca, Improved Pelican and San Pablo, all varieties from Guatemala, were very late in development. Lee, Hampton, Davis and Hill, varieties from U.S., were ready before any signs of pod formation were observed on the former three varieties.

Apart from the low yields experienced from the varieties during the month of April, much can be said on the unevenness of the maturation. Harvesting of Lee began on the 4th August and finished on the 27th (two pickings were required Hampton on the 9th and ended on 27th August. Hill begun on the 27th of July and finished on the 27th August. Davis was similar to Lee in maturation time. Blanca, Improved Pelican and San Pablo started to mature on the 23rd September and finished on the 17th October.

Also, what should be mentioned of these varieties is that approximately 75% of the bean harvested was of poor quality; moulds and fungi attack the pods before they are dry and cause the bean to decay while on the plant.

Conclusion

There seems to be some photoperiodic effect on the three varieties obtained from Guatemala.

Results and Discussions - Soybean May Planting

The yields obtained from the May trial is somewhat higher than that of April. However, it is still far below average expected yield.

Again iron deficiency was experienced in the plots and iron sulphate was sprayed at 100 ppm. concentration to control this effect.

Overhead sprinkler was used for this trial in order to encourage uniform germination and growth.

The highest average yield obtained from the varieties was from San Pablo 7.8 cwt./acre and the lowest yield with Hill, an almost opposite to April's trial in which Hampton gave the highest yield.

/Again crown

Again crown rot fungus was experienced and was controlled with the application of Perenox. Diabrotica which are a predominant insect pest at Central Farm was experienced but was controlled with Metasystox R at the rate of 84 ccs./3 gallons water.

Blanca, Improved Pelican and San Pablo set pods on the 30th July.

Again two harvesting periods were required for Improved Pelican - 8th October and 17th October. The same is true for Blanca and San Pablo.

Hampton was harvested on 18th September and 10th October, Hill on 2nd September and 17th September. Same is true for Lee and Davis.

Blanca appeared to be suffering from weak stalk as approximately 90% of the plants were lodging.

Results and Discussions - June Planting

A spell of drought towards the end of the month of June occasioned a delay in germination of seeds and, as such, germination percentage of all varieties was not quite satisfactory. Replanting and transplanting from guard row had to be practised to provide a satisfactory stand of plants.

A control of 90% approximately was obtained from a spraying with Sevin against the insect species Diabrotica. All varieties developed pods though the variety San Pablo showed a large incidence of undeveloped pods and 100% lodging.

The trial was harvested in October with the variety Hill alone being harvested all at once due to uniform drying of seeds. The highest yield was obtained from Improved Pelican at 25.2 cwt. per acre, this also being the highest individual yield of soya bean seeds so far obtained. Overall performance from the June planting was also better than that of the April - and May - planted beans. Highest yields may also have been obtained from San Pablo if lodging was less intense and the incidence of undeveloped/ empty pods were reduced.

July Planting

It was not possible to lay down a trial during this month since there was heavy rain which left the land too soggy to allow for preparation.

Results and Discussion - August Planting

All the varieties with the exception of Davis and Hampton germinated satisfactorily; replanting had to be done to fill the empty spots. The trial was erroneously thinned to a 6" spacing interval within row instead of $2\frac{1}{2}$ ". The factor, however, is of no significance since soyabean allows for very wide range of densities (actually 18,000 to 110,000 plants/acre) within which compensatory factors are brought into play.

Effective control of Diabroticas and caterpillar larvae was attained by spraying with Sevin; and broadleaf weeds and grasses are controlled (95% effective) by spraying with Gramoxone. All varieties were observed on the 12th September to be suffering from wither tip but were seen to have recovered about six days later, only the terminal bud having been affected.

The highest yield was again obtained from the variety Improved Pelican - 23.4 cwt. per acre. This yield, however, as well as overall yield for the month was less than that received from June-planted beans. The second highest yield was given by the variety Blanca, which yield is the highest obtained so far from this particular variety.

Result and Discussion - September Planting

The entire trial had to be replanted because of poor germination percentage of all varieties; and varieties Hill, Hampton and Davis had to be resupplied once more before a satisfactory stand could be achieved. A spraying with Gramoxone at 70cc. per 3 gallons water was conducted to control weeds between the rows, shield being used.

This trial was harvested on 14th, 15th and 16th January, 1969. The days were hot and dry and some degree of pod dehiscence occurred in the varieties Coke 240, Blanca, and Lee. Highest yield in this month was obtained from the variety Blanca with 20.1 cwt. of dry seed per acre. The overall monthly yield was higher than that received from the August-planted trial.

October Planting

Only the varieties Davis and Hampton exhibited low germination percentages at this planting; and replanting had to be done to raise the percentage stand in these plots.

The highest yield so far, 40.6 cwt. per acre, was obtained from this trial and was given by the variety Improved Pelican. Quite a high yield was also obtained from variety Blanca at 39.5 cwt. per acre. It is interesting to note that Blanca has exhibited an almost linear increase in yield from the April through to the October Planting.

General Discussion

It has been seen that the highest yield of seeds has been obtained from beans that were planted in October and harvested in January and early February. The highest individual yield of any one variety was also obtained from planting done in this month. June planting of soyabeans has also given good results with the variety Improved Pelican giving its second highest yield of plantings from April through to October. Generally, all varieties performed best from planting in October and June, in that order of merit. Lowest yields from varieties was mostly obtained from the April and May plantings. This performance may be accounted for by the adverse effect that the dry weather is likely to have had on initial growth and production of vegetative material.

It is also probable that the weather condition at time of harvesting could very much influence the effective seed yield. And the high Yields from the September and October planting may be the result of harvesting during the dry spell when seeds and pods are less liable for attack by fungi and moulds. The August-planted beans, on the other hand, though harvested during a dry month must have suffered some water stress sometime during the month it was planted.

Though germination performance is generally satisfactory the varieties Hampton and Davis have not been performing well in this respect. The latter of these varieties has also given very low yields consistently through the five months it has been planted. The former, Hampton, has in only one instance given a relatively high yield though nothing comparable to the highest yield obtained from Improved Pelican. As such, it may be best to exclude these varieties from further experimentation.

Conclusion

The yield performance of varieties such as Improved Pelican and Blanca are quite interesting and encouraging. These tall, late maturing varieties do not seem pod-shy and are adaptable to mechanical harvesting. It is hoped that enough information will be gathered by June 1969 to plant one or two of the most promising varieties in larger acreages.

SORGHUM

The Response of Grain Sorghum (*Sorghum vulgare*)

Var. Kiowa to N. P & K Fertilizer

Introduction

Grain sorghum is becoming quite popular in British Honduras since the renewed concern of livestock improvement and expansion. The relatively high cost of corn (*Zea mays*) for most of the year makes this crop uneconomical for

farmers to use in cattle feed. As a result of this interest was placed in sorghum. Several varieties of hybrid sorghum have been tested and of these Kiowa has proven to be highest yielding and of the best quality.

However, the correct rate and fertilizer for this variety are unknown; this experiment was done on Red Bank clay loam at Central Farm.

Objective

To study the effect of the three major nutrients (N, P & K) on the yield and growth of Grain Sorghum (Var. Kiowa).

Materials and Methods

1. Site: Riverside area, Central Farm.
2. Soil type: Redbank alluvial clay loam.
3. Design of Experiment: A randomized design with 27 treatments.
4. Treatments:
 - (i) Sulphate of Ammonia: 200 & 400 lbs./acre
 - (ii) Triple superphosphate: 100 & 200 lbs./acre
 - (iii) Muriate of potash: 100 & 200 lbs./acre.

Pre-planting

The area was cleared of debris, ploughed and harrowed with Massey Furguson implements to give a medium fine tilth.

Planting

The trial was laid down on the 7th June, 1968. All plots were planted by hand, rows were 2 ft. X 4 ft. each. The different rates and types of fertilizers were applied to their specific plots by hand.

Results and Discussions

In the early growing period of the crop, annual and perennial grasses were observed. Gramoxone (Paraquat) at the rate of 2 pts. per acre was therefore applied, with the aid of a shield, between the rows. Weeds that were noticed between the plants were removed by hand.

Damage caused by armyworm (*Laphygma* Sp.) and *Diabrotica* were controlled in late June and early July with Telodrin at the rate of 60 ccs./3 gallons of water.

The general growth of the plants was quite normal throughout the entire growing season. In early September, just before harvesting, about 20% of the stools were putting out tillers. This is due to heavy rains experienced during this time. Also some of the grains on the stalks were germinating, again because of the high rainfall.

In table XII it can be seen that :-

- (i) with no potash or phosphate added, yields decreased as nitrogen levels increased;
- (ii) with 200 lbs./acre each of muriate of potash and triple superphosphate, yields increased as nitrogen levels increased;
- (iii) with no nitrogen or phosphate added, yields decreased as potash levels increased;
- (iv) with an application of 400 lbs./acre sulphate of ammonia and 100 lbs. per acre triple superphosphate, grain yield increased with an increase in level of potash applied;
- (v) the individual treatment combination to give the highest yield was:-

Sulphate of Ammonia at 200 lbs./acre
Triple superphosphate at 100 lbs./acre.

Good yield of grain was also obtained when triple superphosphate alone was applied at 200 lbs. per acre.

Table XII

Yields of Grain Sorghum in Cwt./acre.

	P ₀				P ₁				P ₂			
	K ₀	K ₁	K ₂	Sum	K ₀	K ₁	K ₂	Sum	K ₀	K ₁	K ₂	Sum
N ₀	57.7	42.3	24.2	124.2	41.3	49.2	41.6	132.1	58.4	19.2	22.6	100.2
N ₂	42.5	48.7	21.6	112.8	64.6	36.1	58.2	158.9	36.3	23.8	32.6	92.7
N ₄	23.8	39.0	29.9	92.7	33.7	39.4	51.5	124.6	52.5	25.7	57.5	135.7
Sum	124.0	130.0	75.7	329.7	139.6	124.7	151.3	415.6	147.2	68.7	112.4	328.3

Conclusion

It has been shown that yield of the hybrid grain sorghum variety Kiowa is greatly influenced by fertilizer as applied to Redbank clay loam at Central Farm. It is significant that highest yields were obtained in the absence of potash and, furthermore, that increased potash levels had a depressing effect on yield when no other fertilizer element was applied.

The highest yield of 6,500 lbs. (approx.) grain per acre was obtained with a fertilizer combination of 42 lbs. Nitrogen per acre applied as sulphate of ammonia (200 lbs.) and 46 lbs. phosphorus pentoxide (P₂O₅) per acre applied as triple superphosphate (100 lbs.)

The Response of Grain Sorghum (Sorghum vulgare: var. Kiowa)

To Nitrogen and Phosphorus Fertilizer Rates

Objective

To study the effect of nitrogen and phosphorus fertilizer rates on the yield and growth of grain sorghum, var. Kiowa.

Materials and Methods

1. Site:- Orange Walk Agstat, Yo Creek.
2. Design of Experiment:- 4 x 5 Randomized Block Design with three replications.
3. Treatment:- Fertilizer:

Nitrogen (Urea)

Control (No Nitrogen)

43 lbs. per acre equivalent

64 " " " "

86 " " " "

Phosphorus pentoxide (Triple superphosphate 46% P_2O_5)

Control (No P_2O_5)

46 lbs. per acre equivalent

69 " " " "

92 " " " "

115 " " " "

The fertilizer was applied in all combinations.

4. Plot size:- Each sub-plot measured 10 ft. x 30 ft. which is equivalent to 1/145 acre; each sample sub-plot measured 7.5 ft. x 29 ft. (1/200 acre).
5. Pre-planting Cultivation:- The experimental site was ploughed and disc harrowed, then levelled by hand.
6. Planting:- All plots were laid out and planted on May 5th, 1968. Seeds were spaced 30 inches between rows and $1\frac{1}{2}$ inches between seeds at the equivalent of approximately 10 lbs. per acre. Each plot was also broadcasted with an equivalent of 100 lbs. muriate of potash per acre in addition to the fertilizer treatments.

Results and Discussions

Two days after planting germination was observed to be 95%. Plots were treated and fertilized as stipulated above; weeding was done on 3rd and 4th May. A few armyworms (*Leptygma* spp.) and froghoppers (*Aescalia* spp.) were found on the plants but damage was not significant. All plants grew well except for a small area that was waterlogged after heavy rains. It was observed on 2nd August that weevils and fungi were attacking grain in its green stage.

Table XIII

Yield of Grain in Cwt./Acre

	Block I				Block II				Block III			
	N ₀	N ₁	N ₂	N ₃	N ₀	N ₁	N ₂	N ₃	N ₀	N ₁	N ₂	N ₃
P ₀	16.0	36.0	52.0	12.0	50.0	13.0	20.0	30.0	11.0	11.0	22.0	24.0
P ₁	20.0	22.0	41.0	9.0	12.0	13.0	20.0	15.0	52.0	9.0	42.0	56.0
P ₂	42.0	33.0	17.0	18.0	46.0	14.0	59.0	12.0	13.0	24.0	20.0	18.0
P ₃	20.0	32.0	60.0	22.0	36.0	56.0	14.0	22.0	15.0	32.0	56.0	22.0
P ₄	16.0	10.0	16.0	18.0	13.0	26.0	17.0	13.0	11.0	7.0	26.0	13.0

The highest individual yield of grain (approx. 6,000 lbs./acre) was obtained from a treatment combination of 64 lbs./acre nitrogen applied as urea and 92 lbs./acre phosphorus pentoxide (P_2O_5) applied as triple superphosphate. This yield was also incorporated into a positive yield response to increasing levels of nitrogen application up to 64 lbs. per acre when 92 lbs./acre P_2O_5 is applied; this relationship is shown in Table XIII. This relationship was maintained over two blocks (I & III). Another high yield of approximately 5,000 lbs./acre of grain was also obtained from another treatment combination, this being equivalent to a dressing of 64 lbs. per acre nitrogen and 69 lbs. per acre P_2O_5 . This yield was, however, obtained in isolation as regards its confirmation to yields in related treatments. Moreover, this yield and its relationship to other treatments was unique to Block II for this particular treatment combination.

Conclusion

It is indicated from the results that under the conditions experienced at the Agstat at Yo Creek, a nitrogen rate of 64 lbs. per acre would give the best yields in grain sorghum when combined with a phosphate level of 69 to 92 pounds per acre pentoxide. There was obvious, ample evidence (See table XIII) that at 115 lbs. P_2O_5 per acre phosphate had in almost all cases a depressing effect on yield.

SECTION II - PASTURE

Arable Ley Rotation Trial Ref. R.D. 806

This year the land was divided into six acres for pasture and approximately six acres for the planting of corn and Red Kidney beans, the pastures being the same as were used in 1967. In November 1967 eleven steers averaging 544 lbs. were introduced to pasture and were removed on May 3rd, 1968. A second lot of steers averaging 495 lbs. were introduced to pasture on July 1st and fed until December 1968 when the trial was disrupted by an improvise order for slaughter of these cattle.

One crop each of corn and beans was harvested this year with an average of 2,600 and 1,400 lbs. per acre respectively.

Procedure

The twelve acre block is divided into six sub-blocks each of approximately two acres. Three of these sub-blocks are used for pasture and three for Agronomic crops. During this year no crop was obtained from one block chosen for Agronomic Crops because of its unsuitable location in a basin.

In the pasture blocks, the animals are rotated in order to ensure proper sanitary conditions of pastures. Whenever animals are removed from a pasture block, it is fertilized with Urea fertilizer at the rate of 50 lbs. per acre. Animals spend about 21 days in each block, thus providing for each block a rest period of about six weeks between grazing.

CROPS

Corn (Zea Mays)

This year approximately four acres of Poey T66, hybrid corn, was planted in Blocks 5 and 4, the lands being prepared by harrowing in late April and early May respectively before planting in June. Both blocks 4 and 5 were fertilized with nitrogen, phosphate and potash and in July gramoxone sprayed between the rows at a concentration of 35 ccs. per 3 gallons water to control weeds.

An average yield of 2,663 lbs. shelled corn per acre was obtained which represented a profit of \$353.98 according to the costings shown in the appendix.

Red Kidney Beans (Phaseolus vulgaris)

This crop was mechanically planted in Blocks 4 and 5 in December, the land having been preciously prepared by ploughing and rotovating. The fertilizers used were sulphate of ammonia, triple superphosphate, and muriate of potash, each being applied broadcast at the rate of 35 lbs. per acre. In January gramoxone was applied at a concentration of 70 ccs. per 3 gallons H_2O for the control of broadleaf weeds and grasses. In this same month Sevin at the rate of $2\frac{1}{2}$ lbs. per acre was applied from a boom sprayer for control of Diabrotica spp. A slight attack of a leaf rust fungus (Cercospora spp.) was observed in February but required no control measures.

Yield of approximately 1,400 lbs. per acre was realized from the two blocks, thus allowing for a profit of \$429.76 as shown in the appendi

Table I
Second Rotation
Table of Weight Gain

Brand No.	Wt. of July 1st	Wt. on Dec. 4th	Gain in 156 days (lbs.)	Gain/day (lbs.)
41	395	605	210	1.3
8	495	605	110	0.7
11	650	747	97	0.6
48	499	662	163	1.0
47	-	458	-	-
75	498	600	102	0.7
61	512	652	140	0.9
49	399	497	98	0.6
65	563	623	60	0.4
30	444	505	61	0.4

Conclusion

A comparison of the results from the operations conducted in this trial in 1967 and 1968 shows a small marginal difference between profits realized in each instance from each project. The exclusion of Block I from the trial accounts for the decrease in total production and operative costs. The very slow growth rate of animals used in the second rotation (on average of 0.7 lbs./day) accounts for the poor returns from the pasture blocks.

The trial will be continued in 1969 when Agronomic and Pasture Blocks will be rotated since the same blocks have been used for corn and beans for three consecutive years now. As previously, cattle obtained from the Livestock Section will be fattened and "sold" at the time when a desirable weight has been obtained. The cattle will be managed in consultation with the Livestock Officer and the crops will be managed by the Agronomy Section of the Research Division.

Cowpea (*Vigna sinensis*) Micro-nutrient Trial

Introduction

As a result of trials conducted in 1967 at Mile 33 on the Western Highway at Mountain Pine Ridge and three other sites, two more trials were laid down in 1968 - one at Mountain Pine Ridge and the other on Coastal Pine Ridge soil. The treatments used in the 1968 trials were derived from the treatments of the former year.

Trial No. I

Cowpea Fertilizer trial at Mile 33, Western Highway;
Soil Type:- Coastal Pine Ridge soil, Silty sand
Experimental Design:- Completely randomized design with no replications.

Treatments:-

1. Control
2. NPK - 200 lbs./acre.
3. TSP - 200 " "
4. TSP / Zn - 200 lbs./acre / 1,2 and 3 lbs./acre Zn.
5. TSP / Cu - 200 " " / 1,2 and 3 lbs./acre Cu.
6. TSP / Mo - 200 " " / 1,2 and 3 lbs./acre Mo.
7. TSP / Fe - 200 " " / 1,2 and 3 lbs./acre Fe.
8. TSP / Mn - 200 " " / 1,2 and 3 lbs./acre Mn.
9. TSP / Zn / Cu - 200 lbs./acre / 1,2 and 3 lbs. per acre each of Zn and Cu.
10. TSP / Fe / Mo / Mn - treatment as above.
11. TSP / Zn / Cu / Fe / Mo / Mn - treatment as above.
12. TSP / Zn / Cu / Fe - treatment as above.
13. TSP / Zn / Fe - treatment as above.
14. TSP / Fe / Cu - " " "
15. TSP / Mo / Mn - " " "

Three blocks were laid down, each carrying a different level of micro-nutrient.

Sample Plot size: 1/400 acre.

Establishment and Procedures

The trial was laid down on the 16th July, 1968 and actual germination of approximately 95% was noted on 5th August. The occurrence of waterlogging in about two-thirds of the plots caused some stunting and yellowing and necessitated the construction of a drain along the Southern and Eastern sides. The drains were cut on the 28th August and by 3rd September, some six days later, great improvement was shown in the trial with some plants starting to flower.

The first harvest was carried out on the 7th October; uneven ripening of pods made it necessary to reap dry pods on three separate dates. Weight of air dried peas was taken as the measure of yield and effect of fertilizer treatment.

Result

The control plots (those receiving no fertilizer) performed very poorly and plants in all three plots died back, probably because of lack of nutrients or waterlogging or both.

TABLE II

Weight of Air Dried Cowpeas (in ozs.)

Treatments	Block I	Block II	Block III	Total
Control	0	0	0	0
T.S.P.	11	22	27	60
N.P.K.	24	14	18	56
TSP / Zn	22	13	26	61
TSP / Cu	21	10	30	61
TSP / Mn	30	18	20	68
TSP / Mo	14	27	15	56
TSP / Fe	26	8	12	46
TSP / Cu / Zn	18	19	12	49
TSP / Zn / Fe	10	26	19	55
TSP / Fe / Cu	16	4	40	60
TSP / Mn / Mo	9	12	13	34
TSP / Mn / Mo / Fe	10	9	9	28
TSP / Zn / Cu / Fe	11	29	15	55
TSP / Cu / Zn / Mo / Mn / Fe	22	16	22	60
Total	221	227	278	

TABLE III

Treatment Correlations on Micro-nutrient Levels

Positive Correlation	TSP / Mn / Mo (r = $\cancel{+0.96}$)	
Negative Correlation	TSP / Mn (r = -0.77)	TSP / Fe (r = -0.74)
	TSP / Cu / Zn (r = -0.79)	TSP / Mn. Mo. Fe. (r = -0.96)
No Correlation	6 other treatments	

It can be seen in Table II that highest individual yield was obtained from T.S.P. / Fe / Cu in Block 3 and the lowest also from T.S.P. / Fe / Cu, though at a lower level of micro-nutrient. Because of this wide difference which is typical of the responses of the other micro-nutrients, no specific relationship was found between micro-nutrient levels. Combined and separate correlations were run for blocks and treatments and the result showed that according to the correlation coefficient (r = $\cancel{+0.34}$) for block totals there is no significant influence of micro-nutrient level upon crop yield. In other words, the chances that any yield differences may have been caused by micro-nutrient levels are insignificant. The correlation coefficients found for different treatments are given in Table III indicating that the treatment having highest correlation of rate of application and yield are:-

T.S.P. Mn Mo (r = $\cancel{+0.96}$) and T.S.P. Mn Mo Fe (r = -0.96).

Conclusion

Further experimentation is required, and this should consider effect of different rates of the micro-nutrients which in this trial showed some degree of correlation with yield increase or decrease. The fact that the T.S.P. (alone) treatment gave a total yield not significantly less than any other treatment also indicates the need for more detailed studies of the effect of differing levels of Triple superphosphate on yield of Cowpea.

It is not intended to draw specific conclusions from this trial since this is only one in a series from which will eventually evolve a recommendation for fertilizer practice on Coastal Pine Ridge soil.

Trial No. 2

At the time of the writing of this report data is still being obtained from the replication sited in Mountain Pine Ridge.

Costings on Arable-Ley Rotation Trial

	Credit		Debit	
	\$	¢	\$	¢
<u>Livestock:-</u> 1st Rotation:- January to May				
Sale of Cattle from pasture trial	267	52		
Cost of fertilizer			60	00
Cost of applying fertilizer			42	00
Profit	165	52	102	00
2nd Rotation:- July to December				
Sale of cattle from pasture trial	191	60		
Total profit for the year	357	12		
<u>Crops:-</u> Corn				
Sale of corn	496	00		
Cost of harrowing			20	00
Cost of corn seeds			18	00
Cost of planting corn			13	34
Cost of fertilizer			36	66
Cost of applying fertilizer			9	34
Cost of herbicide			20	00
Cost of applying herbicide			9	34
Cost of harvesting corn			13	34
Profit for the year	355	98	140	02
<u>R. K. Beans</u>				
Sale of Red kidney Beans	830	76		
Cost of harrowing and rotovating			60	00
Cost of bean seeds			40	00
Cost of Planting beans			20	00
Cost of fertilizer			100	00
Cost of applying fertilizer			14	00
Cost of herbicide			25	00
Cost of applying herbicide			14	00
Cost of harvesting beans			128	00
Profit for the year	429	76	401	00
Total profit for the year	1,142	86		

VIII

PEST AND DISEASES

Three trials were laid down in the latter part of the year; two by the Plant Pathologist and one, that of the N:P ratio in controlling Rice Blast, by both the Pathologist and Agronomist. Details of the trials follow:

RICE BLAST TRIAL

OBJECTIVES

This experiment was designed to determine the most effective nitrogen to potassium ratio (N:P) in combatting the rice blast disease caused by the fungus Piricularia oryzae.

MATERIALS AND METHODS

A piece of land in the Horticultural Section, Central Farm about 1/5 acre (64 ft. x 136 ft.) was divided down its length into 3 blocks with a 2 ft. walkway between the blocks. The rice varieties Nilo 47, Nilo 3 and IR-5 were seeded at the rate of 100 lbs. per acre. Each block was planted with one variety only. Each block was divided into 16 plots of dimensions 8.5 ft. x 20 ft. (1/260 acre).

At planting all plots were fertilized with an equivalent of 100 pounds of Triple Superphosphate (T.S.P.) per acre. The other fertilizers were at the following levels:

A - 150 lbs. Urea	100 lbs. KCL.
B - 200 " "	100 " "
C - 300 " "	100 " "
X - 100 " "	150 " "
Y - 100 " "	200 " "
Z - 100 " "	300 " "

The control plot was fertilized with an equivalent of 100 lbs. Urea 100 lbs. T.S.P. 100 lbs. KCL per acre. The Urea fertilizer for each plot, except that of the control plot, was divided into two portions at an approximate ratio of 2:1 and each portion applied at a different period. The 2/3 portion, which was the basic application, was done at planting. This was as follows. All rates are per acre equivalent.

A - 100 lbs. Urea	X - 70 lbs. Urea
B - 125 " "	Y - 70 lbs. "
C - 200 " "	Z - 70 " "

The second application which was the 1/3 portion was applied two months later as follows:

A - 50 lbs. Urea	X - 30 lbs. Urea
B - 75 " "	Y - 30 " "
C - 100 " "	Z - 30 " "

The seeds was sown by hand in narrow furrows. The basic application of fertilizer was broadcast and the second application was also broadcast after the land was drained. Irrigation was by flood using a pump. Harvesting was done by hand. Inoculation of the blast fungus was obtained from old rice straw from Big Falls Ltd.

RESULTS

Statistical analysis could not be applied to the results because of several factors. The land was not levelled properly and this resulted in unevenness of water on the blocks. The Nilo 3 failed to germinate and so this block had to be abandoned. The pump was non-functioning for a while which resulted in inadequate water in higher arears. Birds took a heavy toll of the crop before it was harvested. A man assigned full-time to keep off the birds proved ineffective. The following tables show the results obtained.

TABLE I

Yield Data on Rice Variety IR-5

Fertilizer Treatment	Weight of Grain Unfanned		Weight of Grain Fanned		Weight of Blasted Grains	Percentage Blasted Grain
	(lbs)	(ozs)	(lbs)	(ozs)		
AZ	4	1	5	3	3	4.6
CY	6	8	5	11	12	11.5
BZ	7	6	7	1	4	3.3
A	6	14	3	10	3	2.7
BY	8	5	7	6	12	8.9
AX	6	10	5	11.5	10.5	9.9
BX	7	9	6	10	12	9.9
CZ	11	2	10	1.5	6.5	3.6
Y	14	6	13	9	10	4.4
CX	9	14	9	0	7.5	4.7
C	14	15.5	13	13	17	7.1
AY	15	9.5	14	6	10	4.0
Z	8	6	8	0	4.5	3.3
B	10	4	9	7	10	6.1
X	6	0	5	2	11	12.2
CON	1	1	0	12	4	2.5

TABLE II

Yield Data on Rice Variety Nilo 47

Fertilizer Treatment	Weight of Grain Unfanned		Weight of Grain Fanned		Weight of Blasted Grains		Percentage Blasted Grain
	(lbs)	(ozs)	(lbs)	(ozs)	(lbs)	(ozs)	
B	0	2	0	1	0	0.5	25
BX	0	3.5	0	3	0	1	22.2
BY	0	8	0	5.5	0	2	25
CZ	1	4	0	14.5	0	4	20
A	1	1	0	14	0	4	23.5
CON	0	15.5	0	12	0	3	19.3
CY	1	11	1	5	0	6	22.2
C	3	7	2	14	0	6	10.9
AY	3	13	2	15	0	7	11.4
X	2	8	1	11	0	12	30
CX	2	7	1	8	0	14	35.8
Y	2	13	1	12	0	15	33.3
BZ	3	4	1	12	1	4	38.4
Z	3	4	1	12	1	4	38.4
AZ	1	14	0	12	0	14	46.6
AX	1	8	0	8	0	13	54.1

Close observation of the data on Tables I and 2 shows the following:

IR-5

Highest yields: AY, C, Y, CZ, B in decreasing order of magnitude.
 Highest Blast percentages: B, AY, AX, BY, C in decreasing order of magnitude.
 Highest Blast by Weight: C, CX, B, AY, AY in decreasing order of magnitude.

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Nilo 47

Highest yields: AY, C, BZ, Z, Y, X, CX in decreasing order of magnitude.
Highest Blast percentage: AX, AZ, Z, BZ, CX, Y in decreasing order of magnitude.
Highest Blast by Weight: Z, BZ, Y, AZ, CX, Ax, X in decreasing order of magnitude.

Although, as previously mentioned, the Nilo 47, being earlier maturing than the IR-5, was more severely damaged than the IR-5. The information obtained from the two varieties agrees very closely and gives a good indication of the effect of fertilizer on the blast disease of rice. This same information applies to brown leaf spot of rice (Helminthosporium oryzae) disease also. The trial became naturally infected with this fungus, and it is known that this disease responds to the N:K ratio also. Observations bear this out.

The data shows in both varieties that the treatment AY gave the highest yields and the lowest percentage of blasted grain. This corresponds to 250 lbs. Urea / 300 lbs. of KCl per acre. The second highest yields in both varieties was treatment C, 300 lbs. Urea / 100 lbs. KCl; but this treatment also had a percentage of blasted grain. The third highest yield in IR-5 and the fifth in Nilo 47 was treatment Y, 100 lbs. Urea / 200 lbs. KCl. In this treatment percentage blast was very low. The controls had relatively low percentage of blast, but had very low yields.

The rest of the data shows that wherever the Urea application exceeds that of the KCl, the incidence of blasted grain is increased. This is also true where KCl application exceeds 300 lbs. per acre. This is probably due to toxicity of excess potassium.

SUMMARY & CONCLUSIONS

A trial laid down to obtain data on rice blast disease also yielded data on control of brown leaf spot. Although several factors beyond our control intervened to render the data unsuitable for statistical analysis, the results obtained gave a very good indication of the effect of the N:K ratio on the diseases in question.

The data showed that the optimum N:K ratio corresponds to 250 lbs. Urea / 300 lbs. KCl per acre. Any treatment where the urea application was higher than the KCl resulted in increased blast and any treatment where the KCl application was greater than 300 lbs. per acre resulted in decreased yields and increased percentage blast.

It is hoped to continue this line of investigation under more favourable conditions and on the major soil types on which rice is grown in the country. It would also be worthwhile to determine if phosphorus has any influence in this set up.

FALL ARMYWORM CONTROL: 1968 - MAY

OBJECTIVES

The fall armyworm (Spodoptera frugiperda) causes substantial reduction in crop yields of corn every year. A trial at Central Farm was designed to compare the effectiveness of three of the regular insecticides used in controlling this insect. Data on percentage kill of the insects and on the effect on yield by insecticide treatment was collected.

MATERIALS AND METHODS

A block of land 100 ft. x 261.56 ft., was marked out in a field of the hybrid corn variety Poey T 66 in the Agronomy Section by the Riverside Irr. block of 0.6 acre was subdivided into 24 plots of 25 ft. x 43.5 ft. (0.025 acre)

/The three

The three insecticides used were DDT, Dipterex and Sevin. DDT was used at a concentration of 0.1% of active ingredient, Dipterex at 0.1%, and Sevin at 1.1%. A Kestrel Polypak sprayer was used in applying the spray solution at the equivalent rate of about 30 U.S. gallons per acre.

Each plot had nine rows of an average of 44 plants. This gave an average of 16,000 plants per acre. Twenty-four hours after applying the insecticides, 4.5% of the plants from each plot was sampled to determine the percentage of armyworm killed. Two plants from each of the nine rows in each plot were pulled up and completely taken apart to find both live and dead caterpillars. Four plants from each of the nine rows of each plot was harvested and the yields per acre calculated based on this 9% of plants. The grain was at 12% moisture when weighed.

RESULTS

Table I shows that Sevin was the most effective insecticide with 58% kill. Dipterex gave 46.2% kill and DDT gave only 27.0% kill.

TREATMENT												
BLKS	1		2		3		4		Total		Mean	
	L	D	L	D	L	D	L	D	L	D	L	D
A	13	19	12	22	36	10	60	0	121	57	30.3	14.3
B	10	11	18	9	31	12	64	1	123	33	30.8	8.3
C	20	16	16	12	27	2	37	0	100	30	25.0	7.3
D	14	11	15	11	12	10	28	0	69	32	17.3	8.0
E	6	19	30	25	19	10	39	0	94	54	23.5	13.5
F	4	21	19	9	12	7	57	0	92	57	23.0	9.3
Total	67	97	110	94	137	51	285	1	599	243		
Mean	11.2	16.2	18.3	15.7	23	5.8	47.5	0.17	General Mean			
											25.0	10.1
% Kill	58%		46.2%		27.0		0.004%					

TABLE I: Chemical Control of Armyworm: 1968 percent Kill

TREATMENTS: 1 = Sevin 2 = Dipterex 3 = DDT 4 = CONTROL

TABLE II shows the yield data obtained from the different treatments. Sevin shows highest increase in yield over the control. This is in agreement with the higher percentage kill obtained with this insecticide.

TABLE II:

Chemical Control of Armyworm, 1968

Yields in lbs.

	TREATMENTS					
Blocks	1	2	3	4	Total	Mean
A	13.94	12.89	12.94	12.41	52.19	13.05
B	12.56	14.25	12.94	11.13	50.88	12.72
C	13.78	12.83	13.34	12.84	52.79	13.20
D	14.00	13.81	12.77	13.56	54.14	13.54
E	13.17	13.84	12.41	10.16	49.58	12.40
F	12.19	11.44	13.81	10.56	48.00	12.00
Total	79.64	79.06	78.21	70.66	307.58	---
Mean	13.27	13.18	13.02	11.78	--	12.82 General Mean
% Yield increase	13.4	1.7	0.5	--		

Summary and Conclusions

The infestation of armyworm on this trial averaged two worms per plant. One application of Sevin gave 58% kill and an increase in yield of 13.4%. Dipterex, with 46.2% kill, gave 1.7% yield increase; and DDT, with 27% kill, gave 0.5% increase in yield.

There appears to be a direct relationship between percentage kill and percentage increase in yield. Therefore, it is presumable that a second application of Sevin would have given a very high percentage kill with increase in yield in the region of 25 - 30%.

The 13.4% increase in yield in this case represented about 400 pounds of corn. At five cents per pound, this is \$20.00 per acre increase. The cost involved are about \$2.00 to apply the insecticide and 2 pounds of the chemical at \$1.85 per pound. This is a total of \$5.70 per acre. The saving is \$14.30 per acre. With more severe infestation this saving could be doubled or even tripled.

This trial indicates that it is worth the while to spray the corn crop when there is an average infestation of two or more worms per plant. It also shows that, of the available insecticides, Sevin is the most effective and most economical.

PESTS AND DISEASES CONTROL ON BEANS: 1968

OBJECTIVES:

Pests and diseases are the major causes for the low yields obtained from beans in this country. Damage by sucking insects, both in feeding and in the spread of virus diseases suggest that the use of systemic insecticide would be beneficial; a trial was designed to compare the effectiveness of a systemic with a standard insecticide alone and in combination with a fungicide.

MATERIALS AND METHODS

A block of 100 ft. x 200 ft. was marked off in a farmer's field of beans outside San Ignacio. The block was divided into 30 plots of 20 ft. x 33.3 ft. (0.05 acres). The chemicals used were DDT at 0.1% (3 ozs. Didimac in 3 U.S. gallons.) Metasystox R at 0.1% (1 c.c. per liter), and Zineb at 0.35% (1.5ozs. in 3 U.S. gallons). Spray application was with a Kestrel Polypak sprayer. Two applications were made, one on the 19th December, 1968 and the other on the 3rd January, 1969.

Since Zineb, the fungicide, is compatible with both DDT and Metasystox R, it was applied together with the insecticides as a mix where the treatment called for a combination. The beans was harvested and cleaned by hand.

RESULTS:

The yields were much lower than expected. This was due mainly to stealing by people in the area, but also it was found that the beans was to varying degrees mouldy. This was due to dampness during the maturing period.

Table I shows the yields obtained in this trial.

TABLE I

Yields in Pounds of Beans in Pesticide Trial: 1968

Blocks	TREATMENTS					
	1	2	3	4	5	6
A	12.0	12.0	11.5	15.0	11.0	13.0
B	13.0	12.0	12.0	11.0	10.0	10.0
C	11.5	13.0	12.0	12.0	14.0	13.0
D	12.0	14.0	12.5	11.0	11.0	14.0
E	12.0	17.0	15.0	12.0	9.0	12.0
Total	60.5	68.0	63.0	61.0	55.0	62.0
Mean	12.1	13.6	12.6	12.2	11.0	12.4
Yields/Acre lbs.	791.3	889.4	824.0	779.9	719.4	811.0
Difference	-19.7	-78.4	13.0	-13.1	-91.6	--

Treatments: 1 = DDT 2 = Metasystox R 3 = Zineb

4 = DDT/Zineb 5 = Metasystox R/Zineb 6 = Control

SUMMARY AND CONCLUSION:

The yields show that Metasystox R, a systemic insecticide greatly increased yield over the control. The combination Metasystox R/Zineb seems to definitely have a depressing effect on yields. The reason for this is not known. There was no sign of phytotoxicity.

This trial served to bring to light a main problem in yields reduction that of mouldy grain. The farmer in whose field this trial was done averaged about 500 pounds per acre, which is significantly lower than the average of the trial.

BEAN PESTICIDE TRIAL: LATE PLANTING: 1968OBJECTIVES:

This second bean trial was intended to be a completely randomized block design, but because of poor germination only a block of 70 ft. x 100 ft. was suitable for trial. A non-replicated trial was laid down mainly to obtain information on a late-planted crop (February) and to gain information on the effect of Metasystox/Zineb which was observed to depress yields in an earlier trial.

MATERIALS AND METHODS:

The trial was laid out on a parcel of land in Benque. The block was divided into four plots of 35 ft. x 50 ft. Zineb and Metasystox were used alone and in combination. Metasystox was applied at a concentration of 1 c.c. per litre and Zineb at 0.35% or 1.5 ozs. per U.S. intervals and four applications of Zineb at weekly intervals.

RESULTS:

Table I shows the yields obtained from the trial.

TABLE I

Bean Yield from Pesticide Trial

Treatments	Yields (lbs.)	Yields per Acre	Difference
Metasystox/Zineb	12.2	305.0	140.0
Metasystox	10.1	253.0	88.0
Zineb	3.5	87.5	-77.5
Control	6.6	165.0	0

OBSERVATIONS:

Drought was the main factor resulting in the low yields. The moisture stress resulted in stunting of plants and poor setting of pods. There was an interaction between drought conditions and the crown rot disease caused by Sclerotium Rolfsii. An increasing percentage of the plants were killed as the drought got more and more severe. This was especially true of the Zineb treated plot which was in a low area. In this plot about 50% of the plants were killed. This would account for the lower yield than the control plot.

The Metasystox/Zineb treated plot exhibited some chemical burn as a result of the spray. This spot was on the highest location and had the best looking plants. The burning should depress yields.

The plots treated with Metasystox did not show any virus symptoms which suggests that the virus diseases of beans are insect transmitted and that Metasystox gives good control of these vectors. The harvested bean was free of moulds. This is one advantage of late plantings.

SUMMARY AND CONCLUSIONS:

Drought is the main limiting factor on late plantings of beans. Crown rot does more damage to the crop than is obvious when soil moisture is adequate. common virus diseases of beans seem to be insect-borne and these vectors can be controlled by a systemic insecticide. Metasystox and Zineb in combination at recommended dosages produce varying degrees of phytotoxicity depending on weather conditions. Beans harvested under dry weather conditions are free from mould.

IX ANIMAL HEALTH

The country remained remarkably free from outbreaks of diseases. However, far from giving grounds for complacency the situation in fact calls for extra vigilance. During the year Government entered into association with O.I.R.S.A. (as a result of which the ban on export of livestock into Mexico was lifted.) and O.I.R.S.A. personnel, with others, conducted a course on plant and animal diseases with particular reference to control of importation.

In British Honduras no routine vaccination of cattle is practised whatsoever (Tate and Lyle are a recent exception). This represents a considerable financial saving to the industry but it follows that the cattle population remains susceptible to these diseases prevalent in neighbouring territories.

A minor outbreak of vesicular stomatitis (confirmed by Rio as New Jersey Type) was reported from Toledo District in April. Two farms only were affected with no further spread. Because of the possibility of confusion with foot and mouth disease it is very desirable that vesicular stomatitis should be included in the schedule of notifiable diseases. A recommendation to this effect was made in April to the Ministry.

No outbreak of Swine Fever was recorded during the year.

From all indications the incidence of both Tuberculosis and Brucellosis appears to have been very low. Two per-acute cases of Babesiosis at Central Farm indicated cerebral involvement. Post-mortem findings at both Central Farm and Blue Creek suggested the possibility of concurrent pasteurella infection. However lack of laboratory facilities prevented confirmation.

In April cases were first reported of a syndrome in pigs characterized by posterior paralysis. At years end the aetiology remains obscure and attempts to cure the condition have been unconvincing although a number of pigs seem to make a spontaneous recovery. Assistance was sought from the veterinary laboratory of the Ministry of Agriculture (N.A.C.I.) and the Middle America Research Unit (M.A.R.U.) in the Canal Zone, Panama. In November a veterinarian of M.A.R.U. visited Belize to collect material for viriology study. The most likely possibilities seem to be "Nutritional ataxia" (so called) or a virus infection.

The only disease of poultry of any magnitude (and that not very great) recorded during the year was presumed to be fowl cholera but lack of laboratory facilities prevented confirmation.

X EXTENSION SERVICES

The staff was active throughout the year and a large number of visits made to farmers both to treat animals and to advise farmers. The specialist Officer paid regular visits to all districts and as the need arose.

XI LIVESTOCK IMPORTS

During 1968 the following list of live animals were imported for breeding purposes:

<u>Type of Animal</u>	<u>No.</u>	<u>Value</u> \$
<u>Bovine Cattle</u>		
Jamaica	8	7,431
Costa Rica	143	49,715
U. S. A.	2	845
Total	153	57,991

Live Poultry:

U. S. A.	Total	55,246	\$20,387
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There was no importations of swine, horses, asses, etc. The cattle imported from Costa Rica were all Brahman, bought by the Government for expanding and improving the Department's breeding herd at Central Farm.

XII STAFF

A list of the senior staff is given at Appendix: The posts of Agricultural Chemist and entomologist remained vacant during the year whilst those of Agronomist and Agricultural Education Officer were filled by Acting Appointments.

XIII ACKNOWLEDGEMENTS

The Department wishes to express its gratitude for the continued help received from other Government Departments, Commercial concerns and private individuals.

H. A. A. A.
Chief Agricultural Officer

APPENDIX I

Senior Staff Postings as at 31st December, 1968

<u>Title</u>	<u>Name</u>	<u>Station</u>
Chief Agricultural Officer	E.W. King	Belize City
Principal Agricultural Officer	H.D. Matheson	Central Farm
Agricultural Chemist	Vacant	
Ag. Agricultural Education Officer	G.C. Ellis	Central Farm
Plant Pathologist	J.E. Link	Central Farm
Veterinary Officer	P.T. Hill	Central Farm
	G. Calderbank	Belize City
Ag. Agronomist (Crops)	N.E. Wade	Central Farm
Ag. Agronomist (Pastures)	R.H. Neal	Central Farm
Livestock Officer	O.O. Orio	Central Farm
Agricultural Engineer	Vacant	
Entomologist	Vacant	
Agricultural Officers	R.S. Pitt	Corozal
	G.C. Aguilar	Orange Walk
	A.L. Navarette	on leave
Farm Planning Officer	P.R. Lizarraga	on study leave
Asst. Agricultural Officers	C.D. Atkins	Belize City
	T.L. Brackett	Orange Walk
	W.A. Grant	San Ignacio
	A.P. Bautista	Central Farm
	F.B. Arana	Toledo District
	W.J. Baeza	Corozal
	N.E. McKenzie	Central Farm
Fisheries Officer	C.G. Rosado	Belize City
Fish and Food Processing Officer	N.E. Wade	Belize City
Fisheries Biologist	G.W. Miller	Belize City

MONTHLY RAINFALL 1968

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	1968	1967	1966
<u>GRAND CAYE</u>															
Grand Caye Agstat	3.62	1.15	.00	.00	5.44	10.01	3.90	2.30	8.30	7.91	2.40	1.03	46.26	52.56	53.32
Grand Caye Agstat US (Lidbertson)	4.80	.62	.00	.00	7.74	7.37	3.44	2.60	4.09	7.16	3.34	2.73	47.76	42.85	49.01
San Juan	3.62	.66	.15	.12	8.35	10.01	3.90	6.32	6.63	10.44	6.31	1.67	58.13	43.39	N.A.
<u>OLYMPIA</u>															
Hillbank	8.58	1.22	.64	5.38	5.33	8.99	4.20	7.36	7.88	8.70	4.08	2.57	59.60	56.64	N.A.
Yo Creek	4.16	.70	1.35	.00	4.10	18.20	6.25	3.73	5.21	4.37	5.88	1.33	55.28	38.86	N.A.
<u>BELIZE</u>															
Landivar	8.35	1.18	.57	.01	5.37	10.17	3.68	6.72	9.53	10.40	5.45	2.66	64.09	62.95	N.A.
Belize International Airport	6.22	1.43	.32	.17	5.62	9.63	5.57	7.93	8.80	10.33	5.41	2.38	63.81	65.06	71.13
Gracie Rock	6.69	1.08	1.35	.80	4.68	10.56	5.93	7.24	14.05	5.70	.00	5.21	63.34	57.36	65.63
Masquil	7.81	1.00	.85	.00	12.49	6.47	8.84	7.23	10.63	9.53	2.85	2.33	70.03	59.58	65.07
Big Falls	5.19	2.82	1.23	.15	2.55	9.95	6.72	6.92	13.69	7.92	6.82	6.09	70.05	54.59	N.A.
Ambergris Caye	6.37	1.64	.42	.02	1.44	9.31	3.56	2.01	9.29	6.86	12.63	.55	54.10	51.92	N.A.
<u>CAYE</u>															
San Ignacio	5.03	.72	1.98	.13	10.67	6.51	6.33	4.62	8.05	6.15	6.89	4.57	61.65	60.53	N.A.
Benque Viejo	N.A.	N.A.	N.A.	N.A.	11.89	14.59	2.53	1.83	3.83	8.64	5.19	3.16	N.A.	N.A.	N.A.
Central Farm	4.59	1.16	1.28	.00	7.02	10.77	4.70	3.85	8.38	6.34	6.69	3.74	58.52	51.75	59.33
Norland	5.09	.78	1.42	.00	7.89	7.78	5.09	3.27	7.79	6.02	7.15	4.18	56.46	52.53	60.22
Augustine	6.18	1.42	2.19	.33	3.25	10.54	1.06	8.34	10.15	10.35	3.99	3.00	60.80	53.46	62.81
Coona Cairn	6.54	2.48	1.82	.12	4.49	9.64	2.63	6.13	9.27	9.15	7.24	5.97	65.48	61.47	63.14
Hai Forest Station	N.A.	N.A.	N.A.	3.42	8.07	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	56.35	N.A.
Sibun Hill	11.51	3.81	1.59	.11	7.80	12.23	9.73	11.39	14.12	9.31	13.28	13.11	110.99	101.28	96.21
<u>STAN CREEK</u>															
Stann Creek Agstat	6.93	2.05	2.01	.26	7.22	11.55	4.45	10.54	13.52	6.33	10.07	4.83	79.76	68.81	83.42
Panama	8.02	2.68	1.42	1.23	7.64	11.31	6.33	9.40	13.32	5.85	8.85	6.69	82.47	79.50	92.58
Molinda Farm	6.43	2.36	.78	.35	6.48	7.89	3.89	7.52	12.29	5.87	9.58	4.97	68.41	55.99	N.A.
Savannah Forest Station	10.20	1.58	1.35	.72	4.83	10.73	6.52	10.59	15.93	11.82	4.79	7.95	87.01	N.A.	95.04
Molinda Forest Station	10.20	1.97	2.11	.11	6.92	10.34	4.14	9.73	12.52	5.79	9.58	4.36	74.80	59.27	N.A.
Cabbage Hall	11.25	3.32	1.87	2.64	4.71	18.14	3.46	9.23	17.17	N.A.	4.51	6.36	82.66	N.A.	N.A.
Sittee River	9.68	1.12	N.A.	N.A.	10.03	4.89	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	59.11	70.32
<u>TOLEDO</u>															
Punta Gorda Agstat	15.71	3.42	1.38	1.90	6.29	27.21	19.63	19.99	16.89	13.58	8.88	8.46	143.44	127.09	147.24
Punta Gorda	18.31	3.41	1.01	1.07	8.82	30.18	19.72	14.63	15.55	10.09	5.60	10.42	82.99	104.48	163.49
San Antonio	N.A.	N.A.	N.A.	2.76	N.A.	13.15	15.06	19.15	N.A.	10.87	5.60	N.A.	N.A.	71.09	N.A.
Barranco	10.50	4.20	1.43	.52	7.38	16.88	14.91	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	72.30	N.A.
Macacha	12.74	2.17	2.40	1.20	12.44	25.75	18.59	20.22	17.95	13.95	9.10	6.55	143.06	122.32	127.00
Monkey River	7.15	1.20	N.A.	N.A.	N.A.	N.A.	N.A.	3.98	3.47	2.81	.98	N.A.	N.A.	58.14	N.A.

1966-1967

Month	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
January	80.0	86.6	89	86.0	91.3	92.9	92.5	94.0	93.0	71.0	85.0	N.S.	
February	80.0	80.7	91	76.0	84.9	88.9	87.0	86.0	86.0	76.0	85.0	N.S.	
March	74.0	82.3	90	82.3	85.2	79.7	78.9	81.8	80.9	71.0	76.0	N.S.	
April	73.0	73.3	89.1	89.0	76.7	79.4	71.0	71.5	73.7	69.0	73.0	N.S.	
May	76.0	76.5	92.0	81.5	78.5	72.6	75.1	72.5	72.0	69.0	76.0	N.S.	
June	78.0	76.5	90.0	84.4	82.9	81.0	85.0	78.0	75.5	73.0	82.0	76.0	
July	81.0	81.5	93.0	81.0	85.7	N.A.	81.0	N.A.	81.0	72.7	79.9	N.A.	
August	81.0	89.7	N.A.	88.0	90.0	84.3	86.0	82.6	83.0	81.4	82.0	84.0	
September	80.0	81.7	N.A.	83.0	90.9	82.6	82.4	84.4	79.3	75.4	83.3	37.0	
October	83.0	80.2	87	N.A.	88.5	82.3	88.0	88.0	93.0	79.0	87.0	96.0	
November	87.0	84.2	85	87.2	81.0	86.9	83.1	90.0	90.0	77.0	84.0	N.S.	
December	80.0	83.2	89	90.6	90.0	85.6	88.3	87.2	91.0	78.9	87	82.6	

STATION DATA 1968

	St. John's College (L. L. Ivins)	Yo. Creek Nat. St.	Laborer's Cope	Cabbage Haul	Melinda Forest Station	Central Farm	Augustine Pine Ridge	Green Chain	Sioux Hill		
January	80.3	80.2	85	78.0	82	80.1	77.3	67.9	64		
February	80	80.4	85.6	80.0	84.3	83.1	75.1	70.1	69.6		
March	83.7	82.8	85.8	84.8	85	83.3	80.9	72.9	72.5		
April	83.0	87.4	91.6	88	90	87	89.9	87.0	83.4	90	86.0
May	90.0	88.2	93.0	89.0	89.7	91	91.4	89.3	93.1	85.8	94
June	89.0	88.5	90.7	87.7	85.7	89.7	88.3	85.5	80.9	90.2	91.0
July	88.0	89.1	96.5	88.0	87.0	89.0	86.8	86.0	79.8	75.0	91.0
August	88.0	87.9	92.2	90.4	87.2	89.3	86.8	84.8	78.6	77.6	91.7
September	75.0	81.0	91.9	89.0	86.0	89.1	87.9	84.3	78.8	77.3	91.8
October	73.0	85.4	90.3	88.7	N.A.	88.2	87.6	81.0	75.0	74.0	89.0
November	70.0	82.3	85.2	85.6	86.1	85.8	81.7	77.9	72.9	72.2	87.0
December	82.0	81.2	85.5	84.6	89.6	82.5	81.6	77.3	71.0	70.6	83.3

STATION DATA 1968

January	67.6	68.4	N.A.	70.8	68.2	71.0	62.9	57.8	58.6	59.0	68.0	65.0
February	65.0	66.0	N.A.	68.5	66.4	70.9	68.0	58.0	57.7	58.4	66.0	65.0
March	67.4	69.6	N.A.	72.0	66.0	74.0	58.9	60.7	58.9	58.5	66.0	64.0
April	72.0	75.7	N.A.	76.0	72.0	71.5	63.6	63.6	64.0	60.0	72.0	60.0
May	75.0	77.0	N.A.	77.3	72.0	76.3	69.5	68.7	66.8	64.9	74.7	73.0
June	77.0	78.2	N.A.	78.2	71.5	75.8	72.1	69.7	67.4	66.2	74.2	74
July	76.0	77.3	N.A.	77.0	72.0	72.6	71.1	66.0	66.5	68.0	75.0	73.0
August	75.0	76.5	N.A.	79.0	72.3	75.0	71.1	68.0	68.5	64.8	76.0	72.0
September	73.0	76.8	N.A.	77.5	73.0	74.5	70.7	67.4	67.0	66.1	75.3	73.0
October	67.0	74.6	N.A.	75.9	N.A.	73.3	70.3	67.7	65.4	63.0	73.0	71.0
November	61.0	71.6	N.A.	72.0	70.0	69.8	66.0	62.7	62.8	63.7	67.0	67.7
December	69.0	70.3	N.A.	71.2	59.9	70.0	65.5	62.3	58.4	58.2	69.2	67.0

APPENDIX IVList of Agricultural Exports - 1968

<u>Articles</u>	<u>Quantities</u> (Figures rounded-off)	<u>Value</u> (actual)
<u>Live animals, Meat, Fish</u>		
Bovine Cattle	391 Heads	44,287
Sheep, Lamb, Goats	39 "	309
Swine (live)	1,474 "	75,878
Poultry "	15,053 "	31,405
Horses	2 "	240
Eggs	24,660 doz.	16,414
Fish (fresh)	293,300 lbs.	81,567
Fish (salted)	96,700 "	17,466
Lobster (Tails)	397,900 "	676,761
Conch	480,100 "	149,512
Shrimp	140,700 "	141,805
<u>Fruits & Vegetables</u>		
Oranges (fresh)	640,000 lbs.	13,068
Tangerine "	1,900 "	108
Grapefruit "	12,000 "	163
Banana & Plantains	241,621 Bhs.	241,145
Coconuts	253,400 nuts	13,378
Other fresh fruits	104,800 lbs.	6,685
Dried Fruit	146,300 "	60,018
Orange Juice	9,607,000 "	1,104,888
Grapefruit Juice	1,880,400 "	183,808
Orange Concentrate	4,399,600 "	1,523,114
Grapefruit Concentrate	47,000 "	11,043
Grapefruit Segments	6,978,300 "	1,433,334
Cucumbers	7,086,400 "	122,391
Tomatoes	900 "	112
Other Fresh Vegetables	20,200 "	1,476
Vegetables, roots & tubers preserved or prepared	1,600 "	71
<u>Other Crops</u>		
Raw Sugar	62,596 tons	9,941,283
Molasses	26,028 "	1,004,416
Honey	397,720 lbs.	69,776,000
Cacao	73,100 "	26,628
Pepper & Pimento	102,411 "	5,470
Tobacco	13,957 "	7,146
Spices	9,270 "	4,635
Maize	63,300 "	3,715
Beans (R.K.)	6,500 "	1,147
Peanuts	10,103 "	1,431

LIST OF VETERINARY TREATMENTS

Diseases or Treatment	Horses	Cattle	Pigs	Sheep	Poultry
Castration	58	62	303	1	
Distemper		4	3		
Mange	19	5	1		
Wounds and Screworm Infestation	25	44	16	7	
Colic	8	11	18		
Swine Fever			4		
Tetanus	7				
Scours	1	16	28		
Dystokia	1		1		
Abcess			3	2	
Anemia			2		
Strangles	2				
Infectious Warts		14			
Mastitis		2			
Swollen Joints		4			
Lampas	7				
Constipation		2	8		
Stomatitis		3	2		
Serum Injection	10				
Removal of Placenta		5			
Prolapsed Vagina		5			
Uterine Infection			1		
External Parasites	54	259	1		
Internal Parasites	58	185	248	13	466
Pneumonia (all causes)	2	5	6		28
... Infection	1		1		60
Preventive Vaccination	7	5	43		441
Respiratory Disease		5			287
Common Cold (Influenza)	8	3			278
...					47
... Typhoid					80
... Pox					189
... Eddiosis					257
... Cholera					357

List of Fisheries Exports
(actual figures)

By destination year 1968

Commodity	U. S. A.		Guatemala		Honduras		Total Exports by Commodity	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Scalefish								
1. Fresh chilled or frozen	265,423	76,468	24,070	4,351	3,758	758	293,251	81,567
2. Salted or smoked			82,807	14,596	13,900	2,680	96,707	17,276
Total, Scale Fish	265,423	76,468	106,877	18,947	17,658	3,428	389,958	98,843
Lobster	397,868	676,761					397,868	676,761
Shrimp	140,657	141,805					140,657	141,805
Conch	465,830	147,330	1,675	229	11,850	1,856	479,355	149,417
Total Shellfish	1,004,355	965,896	1,675	229	11,850	1,858	1,017,880	967,983
Total All Fish	1,269,778	1,042,552	108,552	19,176	29,508	5,286	1,407,838	1,066,826
Approx. %	90.2	97.7	7.7	1.8	2.1	.5	100	100
Comparison total exports by Countries - 1967	1,174,845	774,386	24,146	6,031	36,285	5,404	1,235,276	785,821
Approx. %	95.1	98.5	2.0	.8	2.9	.7	100	100

RICE PRODUCTION

Year	Paddy Purchases by Marketing Board	(60%) Equivalent Clean Rice	Est. Total Production Clean Rice	Five Year Moving Average	Marketing Board Imports	Est. Consumption Five Year Moving Average
1954/55	499,407	299,644	370,980	-	3,689,922	-
1955/56	718,692	431,215	533,890	-	3,887,655	-
1956/57	1,301,610	780,966	992,620	-	2,000,000	-
1957/58	1,724,709	1,034,825	1,281,060	-	3,500,000	-
1958/59	1,250,188	1,110,113	1,374,430	910,596	1,800,000	3,866,112
1959/60	1,090,619	654,371	810,160	998,432	5,800,000	4,395,963
1960/61	1,561,534	934,920	1,159,370	1,123,648	1,000,000	3,943,648
1961/62	1,967,423	1,180,454	1,461,490	1,217,422	2,500,000	3,937,422
1962/63	1,625,304	975,230	1,207,440	1,202,698	4,000,000	4,022,698
1963/64	2,718,006	1,630,804	2,019,680	1,331,628	3,500,000	4,491,628
1964/65	4,557,887	2,734,732	3,385,870	1,846,770	2,250,000	4,298,770
1965/66	5,229,831	3,137,839	3,751,024	2,364,781	2,250,000	5,057,636
1966/67	2,648,232	1,588,939	1,878,196	2,448,325	3,000,000	5,448,322
1967/68	2,672,435	1,603,461	1,263,807	2,559,595	2,500,000	2,259,594
1968/69	3,442,087	2,065,252			3,500,000	

Sugar Cane Crop Statistics

	<u>1957</u>	<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>
Acres Cane Harvested	6,500	6,179	7,666	10,058	11,000	11,000	13,000	14,000	15,000	18,200	28,048	29,873
Tons Cane Reaped	77,049	89,635	159,017	123,752	243,460	213,490	210,362	272,319	325,786	411,353	560,954	528,720
Tons Sugar Produced	7,811	11,067	16,712	13,641	27,577	25,817	27,840	33,591	35,288	43,453	58,320	52,138
Tons Cane/Acre	11.85	14.51	20.74	12.34	22.15	19.41	16.81	19.45	21.05	22.6	20.0	18
Tons Sugar/Acre	1.20	1.79	2.15	1.36	2.12	2.35	2.41	2.40	2.40	2.38	2.11	1.76
Tons Cane/Tons Sugar	9.83	8.10	9.40	9.10	8.83	8.16	7.56	8.11	9.23	9.47	9.49	10.24
Annual Rainfall	38.24	60.19	36.26	62.09	48.54	47.58	34.57	67.68	57.22	71.73	46.86	53.38

SLAUGHTER HOUSE RETURNS - 1968

District	Cattle		Pigs	
	No	Dressed Wt.	No.	Dressed Wt.
Corozal	317	129,899 lb.	89	6623
Orange Walk	476	78,376	335	20,227
Belize	3138	868,831	3931	257,411
Cayo	826	172,707	535	39,330
Stann Creek	143	43,262	83	7,718
Toledo	45	11,781	102	6,346
Country	4945	1,304,856	5075	337,655

APPENDIX 10VEGETABLE VARIETY TRIALSMOST FAVOURABLE TIME OF PLANTING

<u>Crop</u>	<u>San Roman</u>	<u>Yo Creek</u>	<u>Central Farm</u>
Tomato	Jan - Feb.	April, July, Sept.	May, June, Sept, Oct, Nov, Dec.
Lettuce	June - Dec.	No Germination	Sept - Jan.
Cabbage	No. Germination	Sept - Dec.	Sept - Dec.
Cauliflower	No Germination	No Germination	Sept - Nov.
Sweet Pepper	-	-	April - May August - Oct.
Broccoli	No Germination	-	Sept - Nov.
Pole Beans	-	-	Sept - Nov.
Carrots	-	-	Sept - Feb.
Radish	Jan - Dec.	-	Jan - Dec.
Cucumber	-	-	August - Sept. Dec - February
Brussels Sprout	-	-	Sept - Nov.
Onions	Oct - Dec.	Oct - Dec	Oct - Dec
Mustard	-	-	Nov - Dec
Spinach	-	-	Nov - Dec
Swiss Chard	-	-	Oct - Dec
Chinese Cabbage	June - Aug	-	-

Remarks:

Rutgers Tomatoes alone survived the Central Farm June planting

